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Ontario Geological Survey
Open File Report 6111

Report of Activities, 2002 Resident Geologist Program

Thunder Bay North Regional Resident Geologist Report: Thunder Bay North District

2003

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Report of Activities, 2002
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Thunder Bay North Regional Resident Geologist Report:
Thunder Bay North District

by

J.K. Mason, G.D. White, M.S. O'Brien and C. Komar

2003

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Thunder Bay - South	Suite B002, 435 James St. S., Thunder Bay P7E 6S7	● ■ ▼ ▲	(807) 475-1331 (807) 475-1311	(807) 475-1112 (807) 475-1124
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Ontario Geological Survey
Resident Geologist Program

Thunder Bay North Regional Resident Geologist (Thunder Bay North District)—2002

by

J.K. Mason, G.D. White, M.S. O'Brien and C. Komar

2003

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THUNDER BAY NORTH DISTRICT—2002

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INTRODUCTION

The communities of Pickle Lake, Osnaburgh House, Weagamow Lake, Big Trout Lake, Beardmore, Jellicoe, Longlac, Geraldton, Macdiarmid, Nakina, Armstrong, Fort Hope, Kasabonika, Lansdowne House, Summer Beaver and Webequie are situated within the district.

MINING ACTIVITY

The **Musselwhite Mine**, owned by Placer Dome North America Ltd. (68%) and TVX Newmont Americas (32%), is located approximately 126 km north of Pickle Lake. Access to the mine site is by means of an all-weather airstrip on site or a 43 km, all-weather gravel road connecting the mine site to the northern extension of Highway 599. The mine employs about 273 persons and 101 contractors.

Gold at the Musselwhite Mine occurs principally in a sulphidized (pyrrhotite), garnet-amphibole-chert-grunerite-magnetite iron formation. The major ore zones occur in shallow-plunging, antiformal fold closures of minor folds within a large, complex fold structure. Sulphidization and quartz flooding occur along a well-developed, axial planar cleavage in the fold hinges.

Access to the ore is by means of a ramp. A conveyor system was installed in 2002 to haul ore from all levels of the mine. Production was expanded to 4000 tonnes per day in 2002.

In 2002, the mine produced 258 427 ounces of gold from 1 205 000 tonnes at 6.08 g/t gold. Ore reserves as of December 31, 2002, were 11 914 000 tonnes at a grade of 5.44 g/t gold for a total of 2 083 646 contained ounces.

EXPLORATION ACTIVITY

As of December 31, 2002, there were 7378 active claims, totalling 43 593 claim units, in the Thunder Bay Mining Division (comprising both the Thunder Bay South and Thunder Bay North districts). A total of 10 175 claim units were staked in 2002. A total of $4 023 500 of assessment work was filed from exploration programs in the Thunder Bay North District in 2002.

Fifty-seven exploration programs were undertaken in 2002.

Platinum Group Elements (PGE)

PGM Ventures Corporation has initiated an exploration and evaluation program on the Thierry Mine property at Pickle Lake. A $1.8 million program involving drilling, geophysics, surface trenching and metallurgical studies will be conducted to evaluate the platinum group element (PGE) and nickel content of the former copper producer. Work in 1982 by UMEX indicated a 15.5 million ton resource remaining at the Thierry Mine grading 1.92% Cu. A 5.6 million ton tailings pond at the mine site was sampled to evaluate the PGE potential. To date, 27 300 feet

(8321 m) of surface drilling on the Thierry deposit and Ros (K-1-1) zone have been completed. PGM Ventures Corporation confirmed the presence of 2 economic grade, PGM-enriched mineralized zones averaging 4 to 8 m in thickness. Sampled drill hole sections ranged up to 8.01 g/t platinum + palladium. A recalculation of the ore reserve, focussing on the PGE potential, will be initiated, involving the dewatering of the Thierry Mine and commencement of a 15 000 m drill program from 3 levels. The company is also planning the procurement of a 1000-tonne bulk sample to further evaluate the economic potential of the deposit (*Canada Stockwatch*, November 12, 2002, p.14-15).

East West Resource Corporation continued diamond drilling on the eastern, down-plunge extension of the Norton Lake copper-nickel-PGE prospect. A 15 m wide pyrrhotite-pentlandite-rich, brecciated sulphide zone with a lower chalcopyrite-pyrrhotite-pyrite zone, separated by a 1 m gabbro-pyroxenite layer, was intersected. Mineralization has been recognised 500 m further west using geophysics and traced to a depth of 225 m by diamond drilling. One drill hole intersected 12.07 m of the main sulphide zone within a mineralized pyroxenite amphibolite host. A second hole contained an 8.48 m intersection that returned 1.065 g/t PGE, 1.1 pound per ton cobalt, 0.76% Cu and 0.87% Ni. Recent induced polarization (IP) geophysical analysis suggests the presence of a new lens with an easterly plunge similar to the main Norton lens. Anomaly tracing from further detailed geophysical surveys indicates the existence of additional lenses along a 5 to 6 km trend line (*Canada Stockwatch*, October 30, 2002, p.14).

Aurora Platinum Corporation is exploring a "reef-type", layered mafic-ultramafic complex, 30 km north of Lansdowne House in the Sachigo Subprovince. A 6 km long airborne conductive zone has been identified. Diamond drilling over the last 2 years has intersected narrow zones of massive sulphides within 20 to 50 m wide zones of net-textured sulphides (*CCN Newswire*, August 4, 2001). Aurora has signed an option agreement with **PGM Ventures Corporation** for a 100% interest in the adjoining Lavoie Lake copper-nickel-PGE property (*The Northern Miner,* News Release, November 14, 2002).

Spruce Ridge Resources Ltd. conducted stripping, trenching and sampling on the Final Lake copper-nickel-PGE property located 20 km northeast of Jellicoe. Twenty-two geophysical targets have been tested, resulting in the discovery of mineralized zones exhibiting stringers of massive chalcopyrite and pyrrhotite in mafic intrusive rocks.

Kennecott Canada Exploration Inc. has optioned the Eva–Kitto PGE property from **East West Resource Corporation,** replacing a previous deal with the Hunter Dickinson Group. Earlier airborne surveys have outlined a number of electromagnetic conductors around the margin of the ultramafic suite. Potential sulphur sources occur in the Archean basement rocks, including an iron formation along the northern margin of the complex (Press Release, East West Resource Corporation, March 27, 2002).

Superior Canadian Resources Inc. completed an airborne electromagnetic-magnetic survey at the Sim Lake copper-nickel-PGE property, located north of Armstrong. Terraquest Inc. was contracted to complete the approximate 1000 line km time-domain electromagnetic (TDEM) survey.

East West Resource Corporation has located 3 of the 7 known sulphide showings on the company's 21 km long Linsey Bay property, located 70 km southwest of Fort Hope. Preliminary grab sample assay results ranged up to 0.298% Cu, 0.5 pound per ton cobalt, 0.41% Ni and 0.1 g/t PGE, hosted in an anorthositic gabbro. Electromagnetic, induced polarization and magnetic surveys were slated for the winter of 2002-2003 to trace the large disseminated sulphide zones (*Canada Stockwatch*, November 6, 2002, p.12).

Lode Gold

Cantera Mining Ltd. continued with mill construction and stockpiling of ore from the No. 1 Vein (Howells Vein) at the Pickle Crow gold mine. Milling will start this winter at 225 tons per day (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Landore Resources Inc. has initiated a private placement of $1 million to be used for a drill program on the Miminiska Lake property in early 2003 (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Cameco Corporation completed a 5000-foot diamond drill program on the Black Lake (Clamshell Lake) gold property located approximately 25 km east of Sioux Lookout (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Solitaire Minerals Corp. and **King's Bay Gold Corporation** have initiated ground geophysical surveys on their Pickle Crow property in Connell Township at Pickle Lake. Prior exploration identified a steeply plunging zone of gold mineralization within the southern limb of a folded iron formation. Previous drilling at what is known as the Southwest Powderhouse Zone returned assays as high as 0.42 ounces of gold per ton over a 24-foot interval (*Canada Stockwatch*, November 14, 2002, p.33).

Slam Exploration Ltd. staked the Veekay Lake gold property in the Fort Hope area. Located within the eastern Uchi Subprovince, past exploration work has defined 3 gold-bearing zones referred to as the Williamson A, B and C zones. Significant drill intersections range as high as 0.34 ounces of gold per ton over 22 feet (*Canada Stockwatch*, October 29, 2002, p.34-35).

TNR Resources Ltd. has acquired a 50% interest in the Opikeigen Lake gold project from **Slam Exploration Ltd.** and **Pure Gold Minerals Inc.** The property, located in the Fort Hope area of the Uchi Subprovince, hosts 10 known gold prospects over a strike length of 8 km. Exploration work will be conducted under a joint-venture agreement among the 3 companies (*Canada Stockwatch*, October 23, 2002, p.36-37).

Alto Ventures Ltd. has acquired a 100% interest in the Greenoaks gold property located in Pifher Township, approximately 22 km northeast of Beardmore. Known gold showings on the property have been traced at surface for over 1100 feet and drilled to a depth of 100 feet, with key intersections ranging up to 0.22 ounces of gold per ton over 6 feet and 1.9 ounces of gold per ton over 2 feet. The company is currently re-evaluating historical work in preparation for drilling programs to extend the known Greenoakes gold deposits laterally and at depth (*Canada Stockwatch*, October 22, 2002, p.3).

Joint venture partners **Continuum Resources Ltd.** and **Prospector Consolidated Resources Inc.** have completed a detailed prospecting and sampling program on the McVicar Lake property, located 80 km west of Pickle Lake. Work by BHP Minerals Canada Limited between 1984 and 1993 identified at least 3 major shear and fault zones hosting a minimum of 6 gold-mineralized zones. Stripping of the high-grade surface expression at the Chellow Vein along the Bear Head fault zone was initiated (*Canada Stockwatch*, October 18, 2002, p.11-12).

McVicar Minerals Ltd. and **Asia Now Resources Ltd.** staked the Kasagiminnis Lake gold property, located 26 km southwest of Pickle Lake. Previous explorers identified gold mineralization over a strike length of 1.125 km. A total of 2.9 million tonnes grading 0.14 ounces of gold per ton was calculated for the Kasagiminnis Lake prospect. Gold mineralization is associated with mafic tuffs and iron formation (*The Northern Miner*, April 18, 1988).

Candor Ventures Corp. has acquired a 32-claim unit property on Miminiska Lake, west of Fort Hope in the eastern Uchi Subprovince. The Miminiska property covers a geophysically inferred folded iron formation where previous drilling by BP Selco in 1984 intersected high-grade values up to 33.5 g/t Au. BP Selco reports noted visible gold in an arsenopyrite- and pyrrhotite-bearing, grunerite-garnet-chlorite-amphibole iron formation, similar to that at the Musselwhite Mine, 100 km north of Pickle Lake. Candor has re-established part of BP Selco's grid and a detailed ground evaluation was planned (*Canada Stockwatch*, August 15, 2002, p.8).

Gold Summit Mines Ltd. has acquired the Slate Falls gold property in the Meen–Dempster greenstone belt between the Red Lake and Pickle Lake gold camps. High-grade gold values occur in quartz veins in a number of shear zones across the property. Of note, the Sanderson zone averaged 29.5 g/t Au over 1.7 m along a 200 m strike length and the trail zone averaged 20.6 g/t Au over 1.7 m along a 35 m strike length (Press Release, *BCE Emergis E-News Services*, June 13, 2002).

Troon Ventures Ltd. has acquired the Fry Lake gold property, which hosts a series of shear zone-related gold occurrences located in the Meen–Dempster greenstone belt (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Deloro Minerals Ltd. has optioned the 96-claim Keezhik Lake property in the Fort Hope–east Uchi Subprovince area. Exploration work during the 1980s identified 4 separate zones of gold mineralization (*Canada Stockwatch*, June 14, 2002, p.10-11).

E. Anderson prospected, discovered and sampled the Wolverine Bay occurrence east of Kasabonika. Initial grab sampling has indicated values exceeding 2% Cu and anomalous gold values exceeding 25 ppb Au (E. Anderson, Prospector, personal communication, 2002).

Diamonds

Superior Diamonds Inc. announced that sampling conducted in the summer of 2002 in northern Ontario, in conjunction with proprietary magnetometer survey data, has confirmed several areas that are in close proximity to kimberlites. Basal till and esker sampling down-ice from 32 airborne targets was assessed (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Canabrava Diamond Corporation continues exploration work on its Frontier project, centered over 2 areas: the Ogoki area west of Fort Hope; and a larger area covering claims north and south of Pickle Lake. To date, over 22 000 ha of claims have been acquired and 46 863 line-km of an airborne magnetometer survey have been flown (Company Press Release, June 2002).

Rare Metal Pegmatites

Linear Resources Inc. received rare earth element assay results for the summer diamond drilling program at the Seymour Lake tantalum property, located east-northeast of Armstrong. Thirty-two drill holes, totalling 1866 m, were completed, indicating that the North Aubry Zone ranges in true thickness from 10 to 28 m over a strike length of 125 m. Significant coarse-grained tantalum mineralization was noted in drill holes SL-02-15 and SL-02-28 (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Lithic Resources Ltd. has entered into a 60% joint venture agreement with **Big Star Energy Inc.** on its Crescent Lake lithium-tantalum-bearing pegmatite property, located 30 km northeast of Lake Nipigon. Mineralogical studies of numerous large, angular, lepidolite-spodumene-tantalite-bearing granite pegmatite boulders discovered on the property identified a highly fractionated, rare-element-bearing class of pegmatites known to host economic tantalum mineralization (*Canada Stockwatch*, August 9, 2002, p.19).

Volcanogenic Massive Sulphide (VMS)

S. Roach completed detailed mapping and channel sampling of the Wobbegone VMS property in the Metcalfe Lake area, north of Onaman Lake. VMS-style alteration, including zones of sodium depletion, was identified in a whole-rock sampling program (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

S. Parent and **M. Smith** have completed prospecting and geological mapping on the Attwood–Petawanga Lake VMS-gold property, located 25 km southwest of Fort Hope. Previous exploration has outlined 7 significant zones of base metal mineralization, of which only a limited amount of drilling has been undertaken. Copper and zinc mineralization in the drilled occurrences remains open along strike and down dip (Resident Geologist's Files, Thunder Bay North District, Thunder Bay). The Ontario Geological Survey (OGS) has recently flown an airborne geophysical survey (magnetometer and electromagnetometer) under Operation Treasure Hunt, covering this property, which was released in February 2003.

Tribute Minerals Inc. completed an airborne geophysical survey on the Melchett Lake property, located 100 km north of Nakina. Several base metal-mineralized zones have previously been identified along a geochemically favourable horizon. A 340 line-km DIGHEM electromagnetic survey was flown (Press Release, Tribute Minerals Inc., March 7, 2002).

Iron Oxide Copper-Gold

Maple Minerals Corp. and **East West Resources Corp.** optioned the Hanna (Bochana) Cu-Au property located at Lang Lake, 90 km west of Pickle Lake. A 23 M tonne, copper-gold porphyry or Olympic Dam-style deposit was identified. Previous drilling encountered 500 feet of 0.3% Cu and gold values from surface grab samples ranging from 0.5 to 4 g/t Au (Press Release, Maple Minerals Inc., March 12, 2002).

Table 1. Assessment files received in the Thunder Bay North District in 2002.

Abbreviations

AEM	Airborne electromagnetic survey	IP	Induced polarization survey
AM	Airborne magnetic survey	Lc	Linecutting
ARA	Airborne radiometric survey	Met	Metallurgical testing
Beep	Beep Mat survey	OD	Overburden drilling
Bulk	Bulk sampling	ODH	Overburden drill hole(s)
DD	Diamond drilling	PEM	Pulse electromagnetic survey
DDH	Diamond drill hole(s)	PGM	Platinum group metals
DGP	Down-hole geophysics	Pr	Prospecting
GC	Geochemical survey	RES	Resistivity survey
GEM	Ground electromagnetic survey	Samp	Sampling (other than bulk)
GL	Geological Survey	Seismic	Seismic survey
GM	Ground magnetic survey	SP	Self-potential survey
GRA	Ground radiometric survey	Str	Stripping
Grav	Gravity survey	Tr	Trenching
HLEM	Horizontal loop electromagnetic survey	UG	Underground exploration/development
HM	Heavy mineral sampling	VLEM	Vertical loop electromagnetic survey
IM	Industrial mineral testing and marketing	VLFEM	Very low frequency electromagnetic survey

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Beardmore area	Lafontaine, A.	1994	DDH, Samp	OP93-643	42E12/SW-046
Beardmore area	Cox, N. et al.	1994	Pr, Samp	2.15850	42E12/SW-050
Big Trout Lake	Platinex Inc.	2000	AEM, AM	2.21516	53H12/SW-001, 53H12/NW-001
Black Sturgeon Lake	Canplats Resources Corp.	2001	GM, HLEM, Lc	2.22863	52H07/NW-005
Black Sturgeon Lake	Canplats Resources Corp.	2001	GC, GL	2.22907	52H07/NW-006
Black Sturgeon Lake	Canplats Resources Corp.	2002	AM	2.23502	52H07/NW-007
Chief Bay	Canplats Resources Corp.	2001	GC, GL, DDH, Samp	2.22843	52H11/SE-005, 52H10/SW-005
Clist Lake	Ontex Resources Ltd.	2000	AM, AEM, GL, Lc	2.20998	42E12/NE-171, 42E12/NW-180, 42E11/NW-070
Clist Lake	Ontex Resources Ltd.	1999	AM, AEM, ARA	2.20999	42E12/NE-172, 42E12/NW-181, 42E11/NW-071
Clist Lake	Docherty, B.	1994	DDH, Samp	OP94-100	42E12/NE-173, 42E12/NW-183

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
Clist Lake	Metalore Resources Ltd.	2001	GEM, GM, Lc	2.22755	42E12/NE-174, 42E12/NW-185, 42E11/NW-072
Clist Lake	Maki, N.	2001	Str, Tr	2.22993	42E12/NE-175, 42E12/NW-186
Clist Lake	Pichette, V.	2002	Pr	2.24121	42E12/NE-177
Crescent Lake	Maitland, T.	2002	GL, Samp	2.23317	52I08/NW-016
Duffell Lake	Lamoureux, B.	2000	GEM, GM, VLFEM, Lc	2.20787	52O02/NW-001
Duffell Lake	Lamoureux, B.	2000	DDH, Samp	2.20788	52O02/NW-002
Falcon Lake	Inco Ltd.	2000	GL, GM, VLFEM, Max-Min, Lc, Samp	2.21843	52I08/NE-015
Falcon Lake	Wing, A.	1999	Pr, Samp	OP99-433	52I08/NE-016
Ferguson Lake	Avalon Ventures Ltd.	2001	GL, GM, Grav, DDH, Samp	2.22617	52P09/NW-016, 52P09/NE-022
Grand Bay	Canplats Resources Corp.	2001	GEM, GM, IP, Lc	2.22834	52H10/SW-004, 52H11/SE-004
Havoc Lake	East West Resource Corp.	2002	DDH	2.23396	52H14/NE-008
Havoc Lake	East West Resource Corp.	2000	AEM, AM	2.20907	52H14/NE-004
Havoc Lake	East West Resource Corp.	2002	GC	2.22956	52H14/NE-005
Havoc Lake	East West Resource Corp.	2002	DDH	2.23270	52H14/NE-006
Havoc Lake	East West Resource Corp.	2001	GL, Samp	2.22959	52H14/NE-007
Havoc Lake	East West Resource Corp.	2002	Samp	2.24421	52H14/NE-009
Junior Lake	Ninety-Nine Resources Ltd.	2001	GEM, GM, Lc	2.22389	42L05/NW-021
Junior Lake	Ninety-Nine Resources Ltd.	2001	GL, Samp	2.22420	42L05/NW-022
Junior Lake	Berland Resources Ltd.	2001	Pr	2.22446	42L05/NW-023
Junior Lake	Brancote Canada Ltd.	2001	GM, VLFEM, Max-Min, Lc	2.22745	42L05/NW-024, 42L05/SW-026
Junior Lake	Brancote Canada Ltd.	2001	Thin Sections	2.22739	42L05/NW-025
Junior Lake	Brancote Canada Ltd.	2001	GL, Samp	2.22732	42L05/NW-026, 42L05/SW-027
Junior Lake	Brancote Canada Ltd.	2001	DDH, Samp	2.23889	42L05/NW-027, 42L05/SW-028
Kaby Lake	Nelson, M. and Savage, J.	1999	GL, Pr, Tr, Samp	OP99-098, OP99-099	42E13/SE-130, 42E14/SW-044, 42E12/NE-176
Maryjane Lake	East West Resource Corp.	2001	GL, Samp	2.22514	52H09/SE-030
Maryjane Lake	Kennecott Canada Exploration Inc.	2002	AEM, AM	2.23622	52H09/SE-031

Township or Area	Company Name	Year	Type of Work	AFRO Number	Resident Geologist Office File Designation
McBean Lake	Kerr, W.	2001	GL, Samp	2.22106	42E10/NE-049
McQuesten Township	Cote, R, & Cote, R.	2001	Pr, Str, Lc, Samp	2.24112	42E15/SW-030
Metcalfe Lake	Roach, S.	2001	GC, Samp	2.21355	42L04/NE-106
Metcalfe Lake	Roach, S.	2002	GC, GL, Str, Tr	2.23301	42L04/NE-107
Metcalfe Lake	Pelky, R.	2001	Pr	2.23251	42L04/NE-108
Metcalfe Lake	Pelky, R.	2000	Pr	2.23037	42L04/NE-109
Metcalfe Lake	Pelky, R.	2001	Pr, Str, Tr	2.24067	42L04/NE-110a,b
Metcalfe Lake	NWT Copper Mines Ltd.	2002	Str, Tr, Samp	2.24407	42L04/NE-111
Ogoki Lake	Tribute Minerals Corp.	2002	AEM, AM	2.22700	42L14/SE-013, 42L15/SW-013, 42L11/NE-011, 42L10/NW-026
Pangloss Lake	Barrow, S.	2000	Pr, Samp	2.21682	52H14/SW-003
Pangloss Lake	Canplats Resources Corp.	2002	DDH, Samp	2.23930	52H14/SW-006, 52H14/SE-007, 42H11/NE-009a,b
Partridge Lake	Houghton, F.	2001	GEM, GM, Pr	2.23455	42E11/NW-073, 42E11/NE-043
Rich Lake	Slam Exploration Ltd.	2001	Pr, Samp	2.23910	52P09/SE-026
Sim Lake	Whalen Resources Ltd.	1999	GL	2.21996	52P01/SE-005
Thomas Lake	Leo Alarie & Sons Ltd.	2002	GM, Lc	2.23846	42F05/NE-004
Thomas Lake	Leo Alarie & Sons Ltd.	2002	GC, Bulk	2.24201	42F05/NE-005
Tyrol Lake	Metalore Resources Ltd.	2001	DDH	2.22558	42E13/SW-096
Tyrol Lake	Cote, R.	1999	Pr, Str, Tr, Samp	OP99-080	42E13/SW-097
Tyrol Lake	Cote, R.	1999	GL, Pr, Str, Tr	OP99-081	42E13/SW-098
Voltaire Lake	Canplats Resources Corp.	2001	GC, GL, DDH, Samp	2.22839	52H11/NE-007, 52H14/SE-005, 52H14/SW-004
Voltaire Lake	Canplats Resources Corp.	2002	AM	2.23904	52H11/NE-008, 52H11/SE-006, 52H14/SE-006, 52H14/SW-005, 52H10/SW-006,
Willet Lake	Koivisto, R.	1999	GM, VLFEM, Pr, Samp	OP99-071	42L05/SE-043
Windikogan Lake	Metalore Resources Ltd.	2001	DDH, Samp	2.22513	42E12/NW-182
Windikogan Lake	Cowan, M.	1994	DDH, Samp	2.10669	42E12/NW-184
Windikogan Lake	Harte Resources Corp.	1994	GL, Samp	2.15768	42E12/NW-120, 42E12/SW-049

Table 2. Exploration activity in the Thunder Bay North District in 2002 (keyed to Figures 1, 2 and 3).

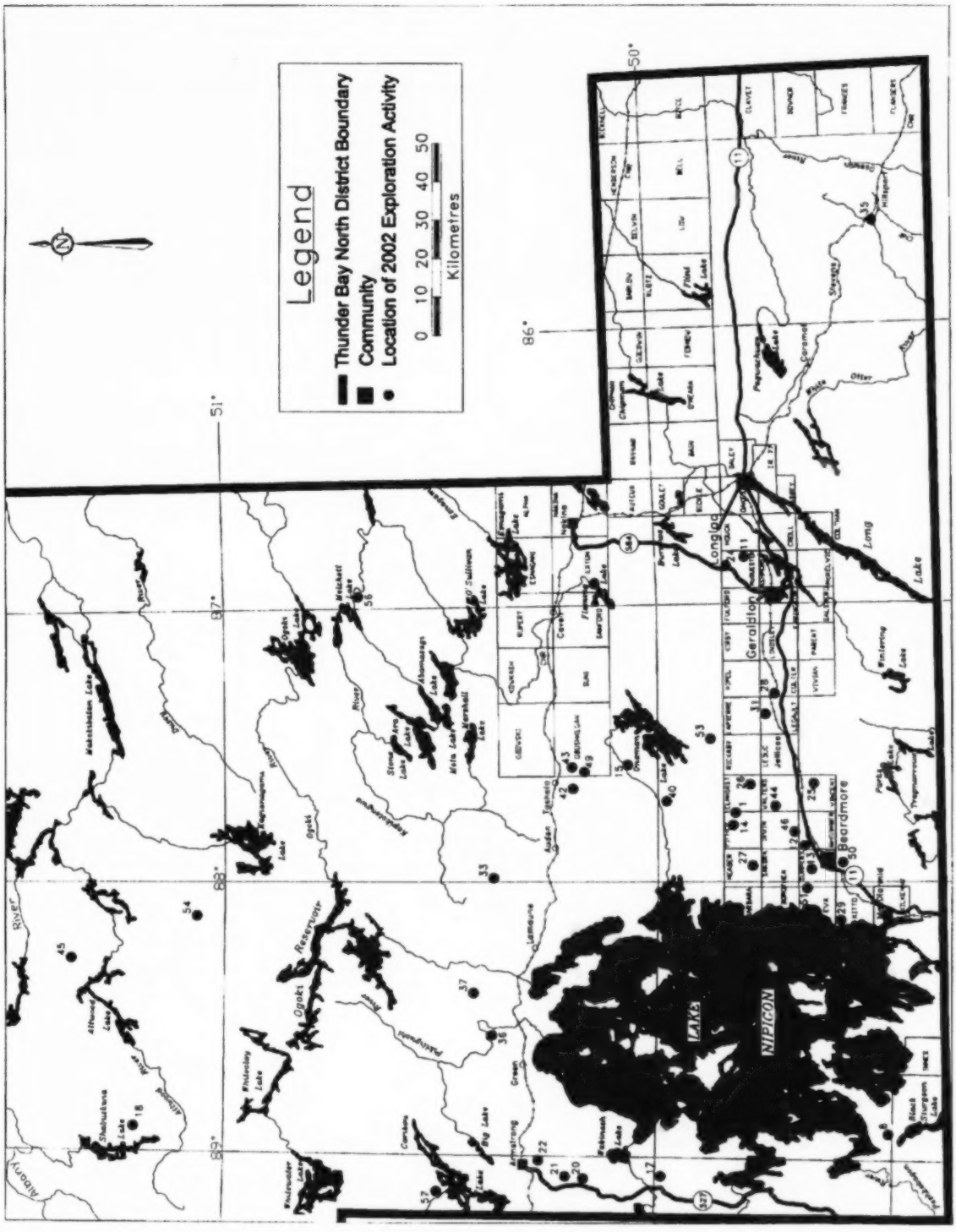
Abbreviations

AEM ..... Airborne electromagnetic survey
AM ..... Airborne magnetic survey
ARA ..... Airborne radiometric survey
Beep ..... Beep Mat survey
Bulk ..... Bulk sampling
DD ..... Diamond drilling
DDH ..... Diamond drill hole(s)
DGP ..... Down-hole geophysics
GC ..... Geochemical survey
GEM ..... Ground electromagnetic survey
GL ..... Geological Survey
GM ..... Ground magnetic survey
GRA ..... Ground radiometric survey
Grav ..... Gravity survey
HLEM ..... Horizontal loop electromagnetic survey
HM ..... Heavy mineral sampling
IM ..... Industrial mineral testing and marketing
IP ..... Induced polarization survey
Lc ..... Linecutting
Met ..... Metallurgical testing
OD ..... Overburden drilling
ODH ..... Overburden drill hole(s)
PEM ..... Pulse electromagnetic survey
PGM ..... Platinum group metals
Pr ..... Prospecting
RES ..... Resistivity survey
Samp ..... Sampling (other than bulk)
Seismic ..... Seismic survey
SP ..... Self-potential survey
Str ..... Stripping
Tr ..... Trenching
UG ..... Underground exploration/development
VLEM ..... Vertical loop electromagnetic survey
VLFEM ..... Very low frequency electromagnetic survey

No.	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
1	Alto Ventures Ltd. (Greenoakes Mine property)	Pither Township (Au, Cu)	Compilation
2	Anderson, E. (Wolverine Bay property)	E. Kasabonika Lake (Cu, Zn)	Pr, Str, Samp
3	Aurora Platinum Corp. (Bartman Lake property)	N. Lansdowne House (Pd, Pt, Cu, Ni)	GL, DD
4	Aurora Platinum Corp. (Lavoie Lake property)	N. Lansdowne House (Au, Zn)	GL, Pr, Samp
5	Canabrava Diamond Corporation	Pickle Lake (diamonds)	AM
6	Canabrava Diamond Corporation	W. Fort Hope (diamonds)	AM
7	Candor Ventures Corp.	W. Fort Hope (Au)	GL, Lc
8	Canplats Resources Corp.	S.W. Lake Nipigon (Pd, Pt, Cu, Ni)	AEM
9	Cantera Mining Ltd. (Pickle Crow Mine)	Pickle Crow (Au)	DD, Mill Construction
10	Continuum Resources Ltd.-Prospector Consolidated Resources Inc.	W. Pickle Lake (Au)	Str, Samp, Compilation
11	Cote, R. and Cote, M. (Alfred Lake property)	N. Geraldton (Cu, Au)	Pr, Samp
12	Cote, Robert and Cote, Richard (Angle Lake property)	McComber Township (Au)	Pr, Samp
13	Cote, Robert and Cote, Richard (Archie Lake property)	Beardmore (Au)	Pr, Str, Samp
14	Cote, Robert and Cote, Richard (Miner Lake property)	Pither Township (Au, Cu, Zn)	Pr, Samp
15	Cox, N. and Holt, L. (Tashota–Nipigon Mine)	Onaman Lake (Au, Cu)	Pr, Samp
16	Deloro Minerals Ltd.	W. Fort Hope (Au)	Compilation
17	East West Resource Corporation (Havoc Lake property)	W. Lake Nipigon (Pd, Pt, Cu, Ni)	DD

No.	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
18	East West Resource Corporation–Resource Development Corporation Ltd. (Linsey Bay property)	N. Lake Nipigon (Pd, Pt, Cu, Ni, Co)	Pr, Samp
19	East West Resource Corporation (Norton Lake property)	N.E. Fort Hope (Pd, Pt, Cu, Ni)	AEM, AM, GC, GEM, GM, DD
20	East West Resource Corporation (Norwood property)	W. Lake Nipigon (Pd, Pt, Cu, Ni)	GC
21	East West Resource Corporation–Resource Development Corporation Ltd. (Pillar property)	W. Lake Nipigon (Pd, Pt, Cu, Ni)	GC
22	East West Resource Corporation (Red Granite property)	Armstrong (Cu, Au)	Pr, Samp
23	Gold Summit Mines Limited (Slate Falls gold property)	S.W. Pickle Lake (Au)	Compilation
24	Greenland, H.	N. Geraldton (Au)	Pr, Samp
25	Holt, L.	Vincent Township (Au)	Pr, Samp
26	Houghton, F. (Mud Lake/ADR property)	Elmhirst Township (Au)	Pr, Samp
27	Houghton, F. (Porphyry Hill property)	Meader Township (Au)	Pr, Samp
28	Houghton, F.	Colter Township (Au)	Pr, Samp
29	Kennecott Canada–East West Resource Corporation–Maple Minerals Corp.	Beardmore (Pd, Pt, Cu, Ni)	AEM, GM, Pr, Samp
30	King's Bay Gold Corporation	Pickle Lake (Au)	GM, Lc
31	Lake Nipigon–Ojibway First Nation	Legault Township (Au)	GEM, GM, Lc
32	Landore Resources Inc. (Frond Lake property)	W. Fort Hope (Au)	GL, Pr, Samp
33	Landore Resources Inc. (Junior Lake property)	N. Lake Nipigon (Pd, Pt, Cu, Ni)	DD
34	Landore Resources Inc. (Talbot Lake property)	W. Fort Hope (Au)	GL, Pr, Samp
35	Leo Alarie Construction Company	Hillsport (diabase)	Bulk sampling, quarry development
36	Linear Resources Inc. (Seymour Lake property)	N. Lake Nipigon (Ta)	GL, DD, Str, Lc, Samp
37	Lithic Resources Inc.–Big Star Energy Inc. (Crescent Lake property)	N. Lake Nipigon (Pd, Pt)	Compilation
38	Maple Minerals Corp.–East West Resource Corporation [Hanna (Bochana) property]	W. Pickle Lake (Cu, Au)	Compilation
39	McVicar Minerals Ltd.–Asia Now Resources Ltd. (Kasagiminnis Lake property)	S.W. Pickle Lake (Au)	Compilation
40	Nelson, M. (Kenty gold-molybdenum property)	Onaman Lake	Pr
41	Norcal Ltd.–Troon Ventures Ltd. (Fry Lake property)	W. Pickle Lake (Au)	Compilation
42	NWT Copper Mines Limited (Adair property)	Tashota (Au)	Str, Tr, Samp
43	NWT Copper Mines Limited (Hull Lake property)	Onaman Lake (Au)	Pr, Str, Samp
44	Ontex Resources Inc.	Walters Township (Au)	DD
45	Parent, S. and Smith, M. (Attwood-Petawanga Lake property)	S.W. Fort Hope (Cu, Zn, Ag)	GL, Pr

No.	Company/Individual (Occurrence Name) or Property	Township/Area (Commodity)	Exploration Activity
46	Pettit, C. (Watson Lake property)	Irwin Township (Au)	Pr
47	PGM Ventures Corporation (Thierry Mine)	N. Pickle Lake (Pd, Pt, Cu, Ni)	GEM, GM, DD, Samp
48	Placer Dome North America Ltd. –TVX Newmont Americas (Musselwhite Mine)	North Caribou Lake (Au)	DD
49	Roach, S. (Wobbegone property)	Onaman Lake (Cu, Zn)	GM, Str, Tr, Samp
50	Roxmark Mines Limited (Northern Empire Mill)	Beardmore (Au)	Custom Milling/Bulk Sampling
51	Rutherford, E. (Eva–Summers property)	Beardmore (Au)	Pr, Samp
52	Solitaire Minerals Corp. –King's Bay Gold Corp.	Pickle Lake (Au)	GEM, GM, DD
53	Spruce Ridge Resources Ltd. (Final Lake property)	Altitude Lake (Pd, Pt, Cu, Ni)	GEM, GM, Str, Tr, Lc, Samp
54	Superior Canadian Resources Inc.	Sim Lake (Pd, Pt, Cu, Ni)	AEM, AM
55	Superior Diamonds Inc.	N. Ontario	AM, Pr, Samp
56	Tribute Minerals Inc. (Melchett Lake property)	Melchett Lake (Cu, Zn)	AEM
57	Valerie Gold Resources Ltd.	N. Armstrong (Cu, Pd)	IP, Lc


Legend
Thunder Bay North District Boundary
Community
Location of 2002 Exploration Activity
0 10 20 30 40 50
Kilometres
N
LAKE NIPIGON
Geraldton
Beardmore
Longlac
Long Lake
Ogoki Reservoir
Ogoki River
Albany River
Kenogami River
Pic River
Pays Plat
Stave
Otter
Penny
Caramat
Hillsport
Nakina
Armstrong
Jellicoe
Rainbow Lake
Big Lake
Shebandowan Lake
Whitewater Lake
Kawashtin Lake
Aroland
Ogoki
Kenogami Lake
Aroland Lake
Stout Lake
Kelly Lake
Kenogami
Pagwachuan
Packsaddle
Lansdowne
Gravel
Armstrong
Rainbow
Penny Lake
Caramat Lake
Otter Rapids
Rainbow Lake
Black Sturgeon Lake
Whitewater Lake
Shebandowan Lake
Kawashtin Lake
Stout Lake
Kelly Lake
Aroland Lake
Kenogami Lake
Ogoki Lake
Ogoki Jackson
Ogoki Reservoir
Albany River
Kenogami River
Pic River
Pagwachuan River
Packsaddle River
Lansdowne House
Gravel River
Armstrong
Rainbow Lake
Big

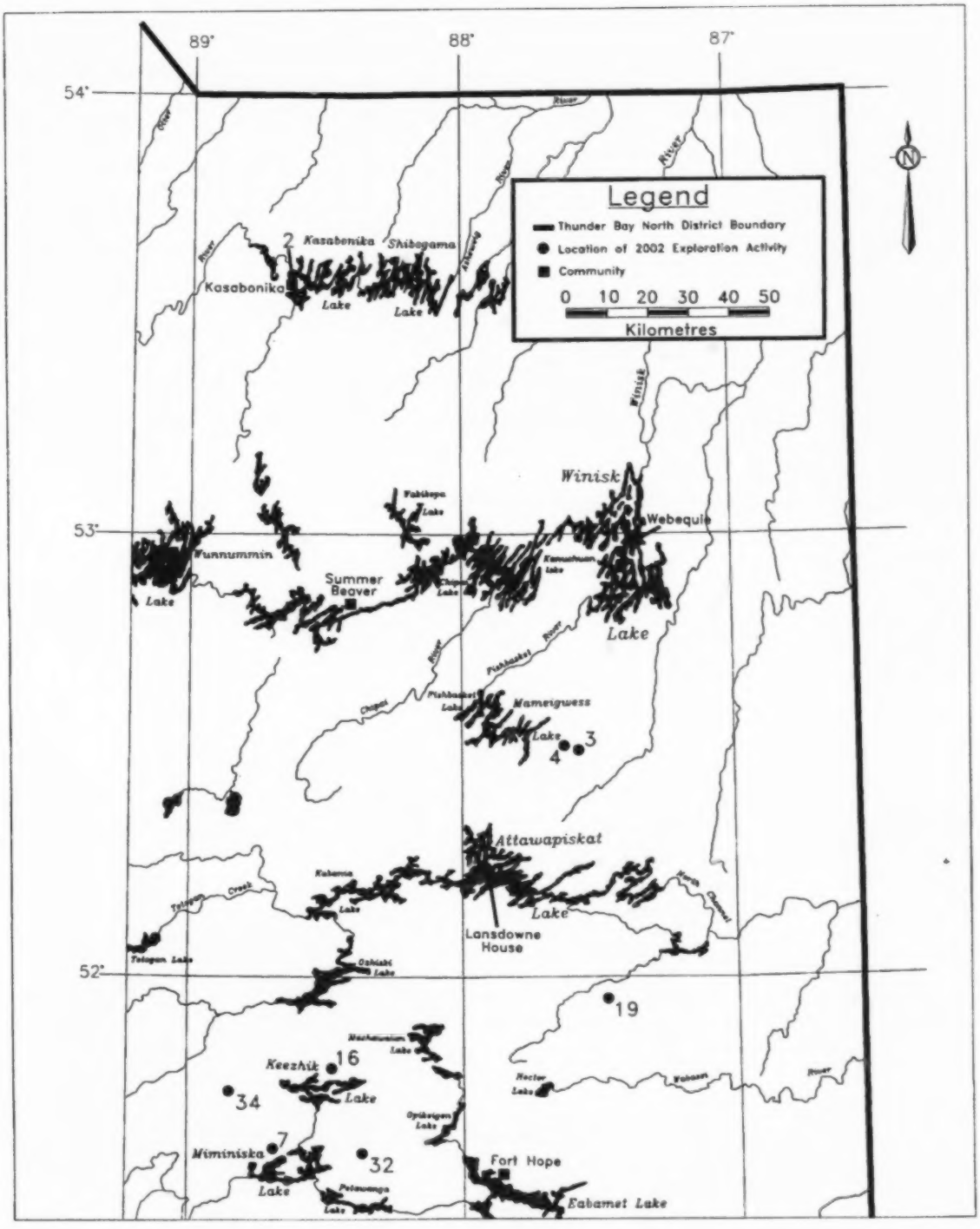


Figure 2. Thunder Bay North District (northeast map) exploration activity, 2002.

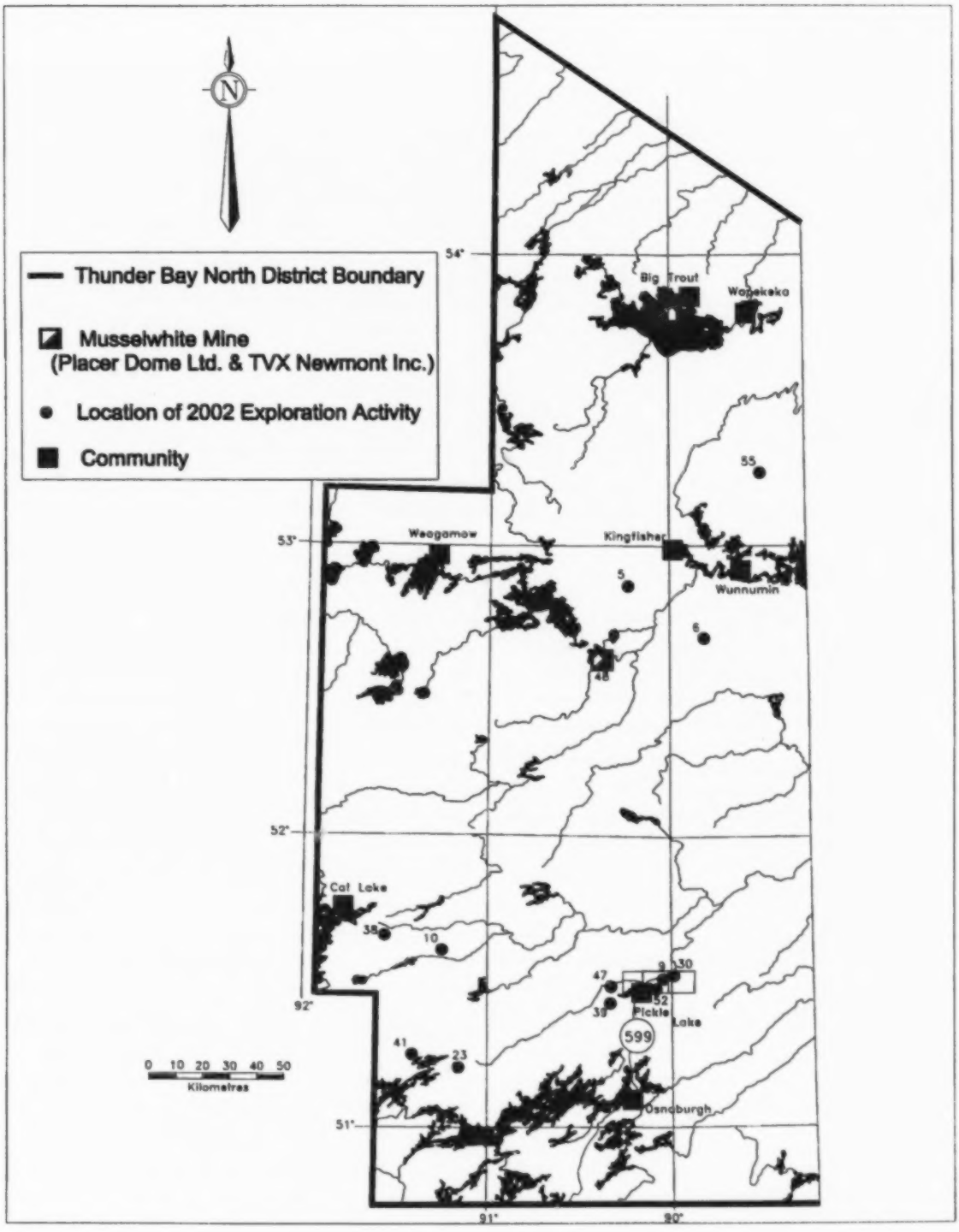


Figure 3. Thunder Bay North District (northwest map) exploration activity, 2002.

RESIDENT GEOLOGIST PROGRAM STAFF AND ACTIVITIES

During 2002, the staff of the Thunder Bay North Resident Geologist Program included J. Mason, Co-Manager NW and Regional Resident Geologist; G. White, District Geologist; C. Komar, Administrative Assistant; and M. Tuomi, District Support Geologist (effective December 2002). Significant support to the program was also provided by M. O'Brien, Regional Support Geologist for the Northwest Region, and A. Dowton, Administrative Assistant. E. Onabigon, Community Resource Geologist, who delivered prospector education and information to First Nations and exploration companies, passed away on July 19, 2002. A. Drost, Regional Land Use Geologist, coordinated and delivered land use planning in northwestern Ontario.

In 2002, 20 property visits were conducted (Table 3). The Resident Geologist Program handled 1268 personal consultations and 1077 telephone and e-mail inquiries in the Beardmore, Geraldton and Thunder Bay offices. The Beardmore field office, established in 1996 in conjunction with the community of Beardmore, was staffed one day per week, from May to October. The Geraldton field office was maintained in conjunction with the Northern Development Office 2 days per month, from May to October. Staff attended the Cordilleran Roundup in Vancouver in January, providing a talk and display; the Prospectors and Developers Convention in Toronto during March, providing displays; the Northwestern Ontario Prospectors Association (NWOPA) Mines and Minerals Symposium in Thunder Bay in April, providing a display and talk; the Manitoba Mining and Minerals Convention in November, providing a display; and the Ontario Exploration Geoscience Symposium in December, providing a display.

Table 3. Property visits conducted by the Thunder Bay North District in 2002.

Number	Property/Occurrence
1	Archie Lake occurrence (R. Cote): Au
2	Brink-Blays Lake lithium-pegmatite occurrence (Metalore Resources Ltd.): Li
3	Central Patricia gold property: Au
4	Eva–Summers property (E. Rutherford): Au
5	Geraldton North property (B. Ainsworth): Pd, Pt
6	Hillsport Diabase Quarry (Leo Alarie Const.): Diabase Ballast
7	Hull Lake property (NWT Copper Mines Ltd.): Au
8	Leitch gold mine property (Teck Cominco Limited): Au
9	Leopard Lake Road Highway Quarry
10	North Geraldton Greenland occurrence (H. Greenland): Au, Cu
11	Northern Empire Mine property (Roxmark Mines Limited): Au
12	Pickle Crow Mine (Cantera Mining Limited): Au
13	Porphyry Hill occurrence (F. Houghton): Au
14	Sand River gold mine property (Roxmark Mines Limited): Au
15	Seymour Lake property (Ontex Resources Ltd.): Ta
16	Solomon Pillars occurrence (Inco Technical Services Limited): Au
17	Summers Township axinite occurrences (R. Cote): Au
18	Thierry Mine property (PGM Ventures Corporation): Pd, Pt, Cu, Ni
19	Wobbegone property (S. Roach): Cu, Zn
20	Wolverine Bay–Kasabonika occurrence (E. Anderson): Cu

PROPERTY EXAMINATIONS

Cote–Archie Lake Occurrence

The Cote–Archie Lake gold occurrence is located in the north-central portion of Summers Township, approximately 1 km west of Archie Lake and 5 km due north of the Beardmore townsite. Access to the main stripped area is gained by travelling west on Highway 580, from the junction of Highway 11 north of Beardmore, for 5.4 km to the 72 Road and continuing a further 4.6 km in a northeasterly direction to the occurrence road. The stripped zone lies approximately 500 m west at the end of a trail. Beardmore prospectors, Robert Cote and Richard Cote, control a group of 4 contiguous claim blocks (TB 1232996, 1232998, 1232999 and 1245742) consisting of 30 claim units, with the main Archie Lake gold occurrence located in the eastern portion of claim TB 1232999. Prospecting, geological mapping, stripping and sampling have been completed by the owners since 1999, primarily concentrated in the northwestern portion of the property.

The earliest exploration in the immediate vicinity of the Cote–Archie Lake claim group was initiated in 1935 during the same time period as the Leitch gold mine discovery, 5 km to the southwest. Various prospecting syndicates, including the Calhet Exploration and Jake–Stur syndicates, individual prospectors and several companies conducted field programs on more than a dozen properties within and surrounding the Cote–Archie Lake group from 1935 to 1989 (Resident Geologist's Files, Thunder Bay North District, Thunder Bay). Stripping, trenching, sampling and diamond drilling were conducted over numerous mineralized (pyrite and arsenopyrite), locally shear zone-related, stockwork quartz-carbonate vein systems, with limited results. Three diamond drill holes, totalling 1115 feet, were completed by the Jones–Sijpkens partnership in 1972 (Thompson 1972) over what later became known as the Archie Lake showing, located immediately southwest of Archie Lake. The highest value obtained was a 2.3-foot drill section assaying 0.04 ounces of gold per ton in a pyrite-rich quartz volcanic breccia unit (Thompson 1972).

In 1989, Placer Dome Inc. completed a 5 hole diamond drilling program, totalling 884 m, on the Archie Lake showing, located adjacent to the Cote–Archie Lake occurrence (MacEachern 1989). The holes intersected sheared, highly silicified and carbonatized mafic metavolcanic rocks and quartz veins containing up to 40% disseminated pyrite, arsenopyrite and chalcopyrite. No assay results were reported. The Calhet occurrence, located approximately 500 m north of the Cote–Archie Lake ground, was first explored in 1935 and later examined by Freewest Resources Canada Inc. in 1992 (Fekete 1992). A stripping and sampling program uncovered 3 significant values greater than 0.05 ounces of gold per ton. A grab sample collected from a banded quartz vein containing 2 to 3% disseminated pyrite and chalcopyrite assayed 0.107 ounces of gold per ton (Hart et al. 2002). The Candela occurrence, located along the western boundary of Cote claim TB 1232999, was explored and diamond drilled by Candela Development Company from 1952 to 1954. Stratmin Incorporated conducted a magnetometer survey, geological mapping and completed a series of 8 diamond drill holes, totalling 1203 m, over an exploration grid covering the Candela showing in 1987 (Kilbourne 1987). The holes intersected intermediate to mafic metavolcanic rocks with interflow chert-magnetite iron formation, quartz ± carbonate veins containing varied amounts of pyrite, chalcopyrite and possibly arsenopyrite. A grab sample of quartz-carbonate vein from an old trench near the Candela occurrence, assayed 0.053 ounces of gold per ton, 2.26 ounces of silver per ton, 6.7% Cu and 4% Zn (Hart et al. 2002).

The Cote–Archie Lake property is located within the west-central portion of the main, east-trending Beardmore–Geraldton metavolcanic-metasedimentary belt, which is part of the southern margin of the Wabigoon Subprovince. Mapping by Devaney and Williams (1989) subdivided the main belt into a series of 6 sub-belts, which were later mapped and further defined by Hart et al. (2002) along the western portion of the belt. The Cote–Archie Lake claims lie in the central metavolcanic sub-belt; their geology was described by Hart et al. (2002) as consisting of intermediate massive and pillowed flows with significant tuffs, lapilli tuffs and tuff breccias, and minor interflow chert-magnetite iron formation. Structurally, the property is bounded along the south by the Standingstone fault, which is described by Hart et al. (2002) as the western extension of the Oxaline Lake–Watson Lake fault and as part of the ductile-brittle shear system on which the Leitch and Sand River mines are situated. The fault is manifested by the development of numerous small, northeast-striking carbonate shear zones (Hart et al. 2002). Approximately 1 km north of the property, tracing parallel to the southern Standingstone fault, is the Sandy Creek fault. Hart et al. (2002) indicated that surface expressions of the fault included numerous, discontinuous shear zones, with associated carbonate and chloritic alteration.

The Cote–Archie Lake occurrence, as observed by staff of the Thunder Bay North Resident Geologist office during an October 2002 visit, is an altered, mineralized zone approximately 15 m by 25 m in size, situated along a north-facing hill. The exposure consists of an iron carbonate-altered (ankerite), quartz-flooded, intermediate metavolcanic rock. Mineralized zones contain between 2 to 30% very fine-grained arsenopyrite and coarser, subhedral pyrite in sheared and brecciated metavolcanic rocks. Assays of grab samples collected by Resident Geologist's staff ranged from 0.02 to 0.79 ounces of gold per ton (Resident Geologist's Files, Thunder Bay North District, Thunder Bay). The zone strikes 070°. Further ground work will be conducted by the owners during the 2003 field season in an attempt to uncover additional mineralized exposures both along strike and parallel to the known zone and to determine the width of the alteration zone. Axinite, a violet-coloured, boron-rich silicate, often associated with known gold deposits, was also observed, by the Thunder Bay North staff, in quartz-calcite veins within 1 km of the occurrence at several locations.

As part of the Phoenix bedrock mapping project, Hart et al. (2002) of the OGS, visited the property and provided a detailed description of the occurrence:

> The property is underlain by massive mafic metavolcanic flows, and a fine-grained gabbro intrusion, that have been weakly to moderately iron carbonatized, and epidote and calcite altered. Epidote occurs as very small patches less than 0.3 cm in size. Mineralization consists of up to 10% fine-grained subhedral pyrite and 20% very fine-grained arsenopyrite in shear-parallel quartz veins that are 0.3 to 1 cm wide. Quartz veins contain sheared wall rock and wall-rock fragments along with massive to semi-massive blebs of sulphide minerals. Also present are north-striking, magnetite-filled fractures less than 0.3 cm wide. The quartz veins are interpreted to be hosted by a shear subparallel to the Sandy Creek fault and the north limb of the regional z-fold, in a dilatent zone associated with the nearby diorite intrusion.

Analytical results of grab samples collected by Hart et al. (2002) of both altered, mineralized mafic metavolcanic wall rock and quartz vein material, returned assays ranging from 0.01 to 0.13 ounces of gold per ton.

It is interesting to note, from mapping conducted by Hart et al. (2002) across 5 townships near Beardmore, that the majority of known axinite (a relatively rare mineral) occurrences are located within the Cote–Archie Lake claim group. Axinite, like tourmaline (which has the same temperature of formation), is reported in several Archean lode gold deposits within the Superior Province and may be a useful indicator of gold mineralization. Examples of axinite association exist at the Cooke Mine in the Chibougamau area, the McWatters Mine in the Cadillac area, and at the Paymaster, Hollinger and Gold Island gold mines in the Porcupine area (Hart et al 2002). Hart et al. (2002) indicated that axinite-bearing veins in the Beardmore area are hosted by metavolcanic rocks intruded by gabbro or diorite sills. The control on axinite formation is interpreted to be calc-alkaline dioritic intrusions, intense carbonatization of the host metavolcanic rocks, and proximity to the contact with metasedimentary rocks, possibly Timiskaming type, and major regional structures and/or faults. These conditions exist on, or adjacent to, the Cote–Archie Lake property and indicates that this area may have been a focus for gold-bearing, hydrothermal fluids. In general, as stated by Hart et al. (2002), prospectors and geologists should pay special attention to axinite-rich regions as an exploration tool.

Hull Lake Property

The Hull Lake property is located in the northwestern corner of Oboshkegan Township, 5 km south of the Canadian National Railway (CNR) mainline, east of Hull Lake and 66 km northeast of Beardmore. Access to the occurrence is via the Kinghorn Road, which intersects Highway 11 7.5 km east of Jellicoe, north to the 86 km marker and south along a secondary bush road for approximately 2 km to the property access trail. A 1 km bulldozer trail leads to the main occurrence.

All 2002 exploration activity focussed on the southwest portion of claim TB 1245402 (6 units), which is currently held by NWT Copper Mines Limited. Work during the 2002 field season included prospecting, extensive stripping, covering 2 main areas, and lithogeochemical sampling. During the stripping process, 2 shallow, 1930s vintage exploration shafts or test pits were uncovered just south of the main stripped zone (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

The Tashota area first experienced a period of intense exploration following the completion of the CNR in 1913. During a period from 1915 to 1920, numerous gold showings were discovered as a result of intensive prospecting and trenching. Gold was discovered just south of Hull Lake around 1915 by Albert Kipper and partner P.B. Cameron. The Kipper–Cameron gold prospect is known today as the Noffke property. Prospecting and trenching were carried out intermittently by the partners into the mid-1930s. In 1938, Coniagas Mines Limited completed detailed sampling across the property. In early 1946, A. Fairfield of Connecticut purchased the claims and formed a company known as Hull Lake Gold Mines to explore the property. At this time, approximately 2800 feet (850 m) of EX core was drilled in 12 to 15 holes, with the most significant intersection being 5.14 g/t Au over 1.5 m (Assessment Files, Thunder Bay North District, Thunder Bay). Patents on 11 claims were granted in 1947 and later acquired by R.J. Noffke in 1956. Four additional patents, contiguous with the Noffke property to the east, were granted to Cuzzola Gold Mines Limited in 1948. There is no available record of work performed on the Cuzzola group (Amukun 1977). From the mid-1970s to 1982, Amax Exploration conducted intensive exploration work (including geological mapping, diamond drilling, ground and airborne geophysical surveys) on numerous properties located in the Tashota, Metcalfe Lake and Oboshkegan Lake areas. Noranda Exploration Company Limited also explored several claim blocks in the area during the same time period, including a small property located immediately northeast of Hull Lake. Ground geophysical surveys by Noranda in 1976 traced a strong, linear conductor across the property. However, lack of bedrock exposure made analysis inconclusive. In 1987, Homestake Mineral Development Company staked 19 claims adjoining the Noffke property to the north and encompassing the Hull Lake occurrence. Geological mapping and geochemical sampling were completed over a cut grid by Homestake, covering the entire property (Christie 1988). Other significant activity within the immediate area included work by Cameco Gold Inc. from 1996 to 1998 on the Knucklethumb Lake property, located approximately 400 m southeast of the Hull Lake claims. Cameco conducted extensive geological mapping, a stripping and sampling program over 5 separate occurrences, a large ground IP survey covering the entire claim group and diamond drilling. NWT Copper Mines Limited acquired the Hull Lake property by staking in 2000 and completed a prospecting, stripping and sampling program during the 2002 field season (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

The Hull Lake occurrence is situated within metavolcanic rocks of the north-central portion of the Onaman–Tashota belt, which is part of the eastern Wabigoon Subprovince. Claim TB 1245402 is underlain by mafic intrusive and metavolcanic rocks, located along the northern contact of the Metcalfe rhyolite sequence, which trends eastward between Metcalfe and Oboshkegan lakes. The sequence appears to form a dome containing quartz-porphyritic rhyolite flows interlayered with zones of hyaloclastite and/or autobreccia. The majority of known gold occurrences are located between Hull and Knucklethumb lakes within the felsic sequence (Stott and Parker 1996).

According to Stott and Parker (1996), the Hull Lake property lies within one of several newly identified, long, tabular gabbroic intrusions. Mapping by Stott and Parker (1996) indicated that the lithologic contacts between this mafic intrusive unit and nearby rhyolitic and basaltic rocks are locally sheared and host quartz and iron carbonate veins and disseminated sulphide minerals. Stott and Parker (1996) stated that exploration for new gold-bearing zones could focus along these sheared contacts between the gabbro sheets and their host rocks.

Although outcrop exposure is poor in the vicinity of the Hull Lake claim, stripping in 2002 by NWT Copper Mines Limited in 2 areas (the Moose and Spring zones) uncovered mafic metavolcanic rocks. Sheared, silicified, mafic metavolcanic rocks are in contact with a highly siliceous, rusty, carbonate-altered, feldspar porphyry unit. Quartz veins have intruded the mafic unit, causing small- and large-scale brecciation, forming angular mafic blocks up to 1 m in size. Exposures within the stripped areas strike at 105° and in general, contain from 1 to 3% pyrite, pyrrhotite and lesser amounts of chalcopyrite as seams, patches and finely disseminated grains. It is interesting to note that in several locations along the access trail leading to the stripped zones, samples of highly gossanous iron carbonate-cemented till were uncovered. This may indicate the existence of an extensive alteration zone nearby.

A compilation of key assay results from initial sampling of the stripped areas by staff of the Thunder Bay North Resident Geologist office (site visit conducted in October 2002) and NWT Copper Mines Limited is given below:

Sample Location	Gold Assay (g/t)	Description	Sample Source
Spring Zone	2.085 g/t	Grab Sample	NWT Copper Mines Ltd. (2002)
Spring Zone	3.050 g/t	Grab Sample	NWT Copper Mines Ltd. (2002)
Moose Zone	0.950 g/t	Channel Sample	NWT Copper Mines Ltd. (2002)
Moose Zone	0.889 g/t	Channel Sample	NWT Copper Mines Ltd. (2002)
Moose Zone	0.959 g/t	Channel Sample	NWT Copper Mines Ltd. (2002)
Spring Zone	3.930 g/t	Grab Sample	NWT Copper Mines Ltd. (2002)
Moose Zone	2.061 g/t	Grab Sample - Siliceous Feldspar Porphyry	OGS (2002)
Spring Zone	1.848 g/t	Grab Sample - Siliceous Metavolcanic rock	OGS (2002)
Spring Zone	1.867 g/t	Grab Sample – Siliceous Metavolcanic rock / Quartz Stockwork Veining	OGS (2002)
Spring Zone	2.373 g/t	Grab Sample	NWT Copper Mines Ltd. (2002)

Pickle Crow Mine

Recent ongoing activity by Cantera Mining Limited of Perth, Ontario, at the Pickle Crow Mine property has involved the construction of a 225 tonne-per-day gravity gold mill on site. The mine property is located approximately 10 km east-northeast of Pickle Lake and consists of 98 contiguous patent mining claims (total area 1584 ha) accessed by an 8 km gravel road from Highway 599 at the townsite. The claim group covers much of the northeastern portion of Connell Township and a small part of the northwest corner of McCullagh Township.

A summary of the previous exploration history at the Pickle Crow Mine, including Cantera Mining Limited's recent activities, is described below (modified after a July 2002 company report by J. Quesnel):

Year	Description	Company
1928	No. 1 Vein discovered (known as the Howells Vein).	McFarlane/Howell Prospectors
1928-1930	Trenching and diamond drilling.	Northern Arial Minerals
1933	Initial shaft sinking.	Northern Arial Minerals
1934	Company Incorporated.	Pickle Crow Mines Ltd.
1935-1966	Mine Production: 3 070 475 tons of ore 1 446 214 gold 168 757 silver	Pickle Crow Mines Ltd.
1981-1984	Exploration and surface diamond drilling. Total drilling of 7620 m on Central Patricia, Pickle Crow and Crowshore properties.	Golden Shadow Resources Inc. Gallant Gold Mines
1985	Acquired property	Highland Crow Resources Inc.
Jan. 1987	Noramco Mining Corporation merges with Highland Crow Resources Ltd.	Noramco Mining Corporation
1985-1988	250 surface DDH totalling 30 480 m plus geophysics, stripping and mapping. 1987 - No. 1 shaft detwatered to 750 level. Drilled 30 holes underground. Mapped No. 1 and 5 veins. July 1988 mine was allowed to flood. Surface openings were secured with concrete caps. Buildings were removed.	Noramco Mining Corporation
1988-1990	Partial feasibility study was completed for underground operation. Decision not to proceed due to capital requirements.	Noramco Mining Corporation-Brampton Mining Services

Year	Description	Company
1999	Wolfden Resources Inc. acquired Pickle Crow Mines Ltd. and 100% ownership of the property.	Wolfden Resources Inc.
June 1999	Final agreement and contract signed by Cantera and Wolfden.	Cantera Mining Limited
Dec. 1999	CML completes a 406 tonne bulk sample in No. 5 Vein (Phase 1) to acquire rights to mine, process and market all metals contained within 100 m of surface. Ore trucked and processed at the St. Andrew Gold Fields mill near Timmins.	Cantera Mining Limited
2000	Phase 2 of advanced exploration program completed. 4310 tonne bulk sample completed. Ore trucked and processed at the Golden Giant mill (Newmont) in Marathon.	Cantera Mining Limited
2001	Acquired property from Wolfden Resources.	Cantera Mining Limited
2002	Construction of a 225 tonne per day extreme gravity mill initiated. Mine life expected to exceed 10 years with a projected annual production of 28 000 ounces of gold. Ore from the Howells No. 1 Vein blasted and stockpiled adjacent to mill site. Gold ore will be mined using open pit methods.	Cantera Mining Limited

The Pickle Crow property is located in the central portion of the Uchi Subprovince, which hosts a 625 km long, tabular, east-trending belt of metavolcanic and metasedimentary units forming a semi-continuous sequence of supracrustal rocks. Production from the Uchi Subprovince (Red Lake to Fort Hope) exceeds 25 million ounces of gold to date (2002). A description of the geology and mineralization in the vicinity of the Pickle Crow property is summarized by J. Quesnel (2002) of Cantera Mining Limited:

> The property is located in the central part of the Pickle Lake metavolcanic belt that consists of an isoclinally folded sequence of northeasterly striking and steeply dipping mafic metavolcanics and metasediments [*sic*] with intercalated iron formation horizons. Porphyries are common throughout the belt and granites have intruded the southwestern part of the region.
>
> The mineralization in the area consists of both free gold and gold associated with sulphides. Mineable gold occurs as narrow quartz-carbonate veins and as fractured iron formation mineralized with sulphides and quartz-carbonate stringers. The higher-grade ore is generally associated with the narrow (0.5 to 3.0 m) quartz carbonate vein/shear systems and have produced in the past the majority of the 1.4 million ounces of gold. Minor silver is also associated with the gold ore.

Cantera Mining Limited is in the process of re-evaluating all known gold reserves and resources, as well as known, defined exploration targets on the property. Based on previous reserve calculations and the success of its bulk sampling program (from 1990 and 2000), the company has calculated the shallow mineable (open cut) gold reserve potential at the Pickle Crow Mine to be 497 077 tons grading 0.35 ounces of gold per ton, or 172 976 in-situ ounces (News Release, Cantera Mining Limited, August 13, 2002).

The current mine plan indicates a five-year life. However, compilation of historic data, including information on recent exploration work conducted by Noramco Mining Corporation in 1988 and Wolfden Resources Inc. in 1999, combined with current, detailed stripping, trenching and sampling by Cantera Mining Limited, indicated a greater than 10-year life span. Production will begin on the No. 1 (Howells) Vein, move approximately 500 m southwest to the No. 5 Vein and subsequently to the No. 13 Vein where Wolfden's surface sampling indicated 1.5 ounces of gold per ton over 19.5 feet. Selected sample results from past drilling by Wolfden Resources Inc. on the No. 1 and No. 5 veins are as follows (Assessment Files, Thunder Bay North Resident Geologist's Office, Thunder Bay):

No. 1 (Howells) Vein:	0.35 ounces of gold per ton over 26 feet
	0.12 ounces of gold per ton over 31.5 feet
	0.35 ounces of gold per ton over 11.5 feet
No. 5 Vein:	0.24 ounces of gold per ton over 20.5 feet
	0.22 ounces of gold per ton over 12.5 feet
	0.24 ounces of gold per ton over 18.0 feet

Two types of ore will be mined by open pit method and processed at the Pickle Crow site: banded iron formation (BIF) and quartz vein material. The BIF is a magnetite-hematite-chert-carbonate iron formation. The quartz veins are crack-seal-textured, tourmaline-rich veins with visible gold and minor pyrite. The BIF attains a substantial width in places (observed to be 3 to 5 m wide on surface at the No. 5 Vein) providing a larger tonnage feed for the mill. In late 2002, both ore types were being stockpiled separately, adjacent to the mill site, employing very diligent grade-control sampling.

The modified AVOCA, three-staged surface mine method and the small-scale gravity mill may become a model for future development of small, high grade gold deposits in the province.

Thierry Mine Project

The Thierry Mine is located approximately 8 km west-northwest of Pickle Lake. The property consists of 11 538 acres of mining leases and staked claims held by PGM Ventures Inc. The Thierry Mine property is accessible by an all-weather mine road from Highway 599, located immediately north of Pickle Lake.

Exploration history dates back to 1946 with the discovery of a copper-nickel mineralized float boulder. Central Patricia Gold Mines Limited conducted a ground magnetic survey, trenching and diamond drilling (18 holes totalling 4144 feet) between 1946 and 1950. The J & I copper-nickel-mineralized zone was discovered. Kapkichi Nickel Mines Limited acquired the property in 1956 and conducted a ground magnetic and electromagnetic survey (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Kapkichi Nickel Mines Limited drilled 8 holes totalling 4609 feet and discovered the G copper-nickel-mineralized zone. In 1969, Union Minière Exploration and Mining Corporation Limited (UMEX) optioned 12 claims from Kapkichi Nickel Mines Limited. UMEX conducted ground geophysical surveys and diamond drilled 60 holes outlining J & I, G and other sulphide lenses. A key geophysical survey was extended to the north of Kapkichi Lake. Anomaly K2:1 was identified and drilled, resulting in the discovery of a copper-nickel orebody that became the Thierry Mine. The initial hole, located just south of Ponsford Lake, intersected 25 feet of black, fine-grained biotite schist of which 20 feet was mineralized with grades of 1.24% Cu and 0.14% Ni (Verbeek et al. 1972). Definition drilling outlined a 12 million ton deposit grading 1.6% Cu and 0.18% Ni. In 1973, a shaft was collared and sunk to 1700 feet, subsequently followed by a decline to the 600-foot level. By 1977, 2 small open pits were mined to the 200-foot level and the mill was officially in production. Also in 1977, geophysical anomaly K1:1, located east of the mine, was diamond drilled. A 73 million ton deposit grading 0.39% Cu and 0.11% Ni, down to 600 feet vertically, was drilled off, with approximately 100 diamond drill holes (Patterson 1980). The Thierry deposit (K2:1) was mined from 1976 to 1982 with only minor production coming from a pit on the K1:1 deposit (Patterson 1980).

Production totalled 967 043 pounds copper; 267 621 pounds nickel; 15 115 ounces platinum; 40 021 ounces palladium; and 14 689 ounces gold from 5.759 million tons of ore (Resident Geologist's Files, Thunder Bay North District, Thunder Bay.

In the late 1980s, UMEX Inc. completed underground and surface exploration that included evaluating the platinum group element content of the Thierry deposit. In 1990, Etruscan Enterprises Ltd. stated that the Thierry deposit had reserves of 7 million tonnes grading 1.88% Cu and 0.23% Ni to a depth of 2500 feet and included significant concentrations of platinum group metals (*Vancouver Stockwatch*, July 12, 1990). In 1982, UMEX Inc. indicated that a 15.5 million ton resource grading 1.92% Cu remained at the Thierry Mine (*The Northern Miner*, November 11, 2002). PGM Ventures Inc. purchased the Thierry Mine property in late 2000 from Etruscan Enterprises Ltd.

The Thierry Mine property is located within the Pickle Lake belt in the central portion of the Uchi Subprovince. Stott (1996) described the geology of the Pickle Lake belt:

> The Pickle Lake greenstone belt is dominantly composed of basaltic flows with some intermediate to felsic volcanic units concentrated in the southeastern part of the belt . . . Contrasts in U-Pb zircon ages from two felsic volcanic sequences and the geophysical evidence of a major fault boundary within the belt permits us to subdivide the Pickle Lake greenstone belt into three tectonic assemblages.
>
> The northern half of the belt, north of an aeromagnetic and electromagnetic discontinuity . . ., has been labelled the Northern Pickle assemblage and might be correlatable in future with similar supracrustal rocks of the North Caribou

greenstone belt in the Sachigo Subprovince. Basaltic strata in this portion of the Pickle Lake belt appear to continue northeastward to form aeromagnetic extensions or "tails" of the belt and conforming with the structural grain of enveloping tonalite gneisses.

The southern half of the belt has been subdivided into two tectonic assemblages. The Pickle Crow assemblages of basalt, iron formation and local quartz porphyry units bears a U-Pb zircon age of 2860±2 Ma for a quartz porphyry (Corfu and Stott 1993b). This assemblage is in apparent structural conformity with a sequence of mafic and felsic volcanic rocks to the southeast that contains an ash-flow tuff with a U-Pb zircon age of 2836±3 Ma (Corfu and Stott 1993b). This age is between the ages of two felsic volcanic sequences (2842 and 2825 Ma) in the Woman assemblage of the Meen–Dempster belt. The Woman assemblage strata continue eastward to form a tail or extension of the belt, which compares in rock types with undated volcanic units that lie on strike further east in northern Miminiska–Fort Hope greenstone belt, separated by a granitoid terrain.

Sage and Breaks (1982) described the geology of the Thierry Mine property:

The Thierry deposit occurs along the northwestern margin north of the Pickle Lake metavolcanic-metasedimentary belt, about 2400 m due north of the Kapkichi Lake deposits.

Previous geological mapping by Dyer (1934) and Duffell et al. (1963) erroneously indicated the contact of the metavolcanics [*sic*] and the granitic batholithic complex to straddle the northern shoreline of Kapkichi Lake. Recent detailed mapping and diamond drill compilation by C. Bowdidge and E. Reeve more definitively extended the southwest to west-southwest trending contact of the Pickle Lake belt respectively to an unnamed lake 6 km northeast of Minominatik Lake and Ponsford Lake. This contact approaches within 270 m of the Thierry deposit.

More specifically, the deposit occurs within a narrow "corridor" of foliated amphibolitized mafic metavolcanics [*sic*] which extends for 10 km west from just above Hook Lake to southwest of Ponsford Lake. This "corridor" narrows to approximately 700 m in vicinity of the Thierry deposit. Granitic rocks of the Pickle Lake Stock and possibly of the Dobie Lake batholithic complex respectively bound the metavolcanic "corridor" to the south and north.

Patterson (1980) described the geology of the Thierry deposit:

The Thierry mine is located in ultramafic and metagabbroic blocks which have been sheared in a mylonitized zone. [These] rocks are mafic metagabbro, talc-carbonate schist, olivine-tremolite-chlorite rock and metagabbro. Remnant igneous mineralogy of the metagabbro is plagioclase (An_{50}-An_{60}) and clinopyroxene with exsolved ilmenite. These alter to a mixture of hornblende and plagioclase. Clinopyroxene-rich gabbro alters to mafic metagabbro; plagioclase-rich alters to metagabbro. The talc-carbonate schist was originally dunite and the olivine-tremolite-chlorite rock, a peridotite. The metagabbro and mafic metagabbro are gradational into each other but the relationship of the talc-carbonate schist and the olivine-tremolite-chlorite rock to the mafic metagabbro and metagabbro is unknown. Shearing of these . . . rocks has produced hornblende-chlorite-biotite schist, a protoblastomylonite which is continuous throughout the length of the mine (2000 metres). The mylonite often includes large blocks of relatively undeformed amphibolite schist, mafic metagabbro, metagabbro and diorite.

Sage and Breaks (1982) described the mineralization of the Thierry deposit:

The mineralization is largely confined to a major shear zone, consisting dominantly of very fine-grained biotite-chlorite-hornblende ultramafic schists. The above three minerals are modally variable and generally the rock contains meager plagioclase. The grain size is usually less than 1 mm.

To a lesser extent, mineralization occurs within associated, relatively less intensely deformed, altered lenses of peridotite and gabbro, distributed along the footwall.

The largest such mass is about 240 m in length and 120 m in breadth, described by Verbeek et al. (1972, p.139) as a "tremolite-chlorite rock with diablastic texture, carrying abundant magnetite, a little ilmenite, and local traces of sulphides, mainly pyrrhotite." A smaller ultramafic body occurs at the west end of the mineralized shear zone "varying from light green tremolite-chlorite rock to darker green actinolite rock, which grades into metagabbro, consisting of hornblende and plagioclase with blastophitic texture" (Verbeek et al., 1972).

The shear zone is apparently conformable to well foliated to schistose and lineated amphibolitic mafic metavolcanic wall rocks. Examination of the small scraped outcrop northwest of the shaft disclosed the subtle presence of deformed pillow structures within fine-grained to medium-grained light blue-green (weathered surface) amphibolitized mafic metavolcanics. Selvedges up to 5 mm in thickness appear somewhat darker on weathered surfaces being mainly composed of hornblende and biotite, slightly coarser-grained than the pillow interiors.

Near the surface the Thierry deposit is composed of one continuous mineralized zone, approximately 980 m in length and varying up to 30 m in width. The mineralized zone, at the time of writing, was open at depth along most of its length as surface diamond drilling penetrated to about 240 m and to 450 m along one section (C. Bowdidge, UMEX, personal

communication). Below 150 m between sections 30E and 36E, the deposit becomes segmented into two zones of roughly equal extent, and somewhat different mineralized character. The northeastern part is a biotite-chlorite-hornblende schist with the sulphides occurring as tiny concordant stringers. In the southwestern segment the ultramafic rocks, in general, are less schistose with the sulphides concentrated in massive stringers separated by disseminated or barren zones (C. Bowdidge, UMEX, personal communication).

The primary sulphide minerals, listed in order of approximate decreasing abundance, are pyrrhotite, chalcopyrite, pyrite and pentlandite. Both violarite and mackinawite have developed as alteration products of the pentlandite. Smythite and millerite respectively occur as inclusions in pyrrhotite and as fine lamellae in chalcopyrite. Magnetite and minor ilmenite are additionally present. Combined volume of sulphide and oxide comprises about 15 percent of the rock. A crosscut on the 180 m level intersected a zone of disseminated bornite in amphibolite (C. Bowdidge, UMEX, personal communication). The initial underground development work indicated by a substantially higher grade of mineralization than indicated by the diamond drilling program (C. Bowdidge, UMEX, personal communication).

Additional significant mineralization is contained within the flanking, relatively undeformed ultramfic lenses, particularly at the western end of the main mineralized zone. Sulphides principally occur in this situation as irregular masses and blebs, also averaging approximately 15 percent by volume of the rock.

The PGE potential of the Thierry property is significant. Patterson (1980) indicated the mill head grade over approximately a one-year period was 0.005 ounces of platinum per ton and 0.015 ounces of palladium per ton. Patterson (1980) reported assay values from grab samples from within the mine workings that ranged from 0.005 to 0.298 ounces of platinum per ton and from 0.009 to 0.327 ounces of palladium per ton.

Three other mineralized zones are known in the Kapkichi Lake area, proximal to the Thierry (K2:1) deposit and associated with mafic to ultramafic sills and dikes:

1. K1:1 deposit (55 million tonnes grading 0.31% Cu and 0.01% Ni);
2. Kapkichi "G" (7.5 million tonnes grading 0.41% Cu and 0.10% Ni); and
3. Kapkichi "J" (37 million tonnes grading 0.40% Cu and 0.12% Ni; platinum and palladium values are not known).

PGM Ventures Inc. began exploration on the Thierry project in mid-June 2002 with the mobilization of a field crew to Pickle Lake and the commencement of line cutting to re-establish and extend the original property grid dating from the early 1970s. The first phase of the program included an evaluation of the former mine tailings by diamond drilling 20 short vertical holes, totalling 296 feet, to test the copper-nickel grade and PGE potential of the estimated 5 million tonnes of tailings (Resident Geologist's Files, Thunder Bay North District, Thunder Bay).

Geophysical contractors JVX Ltd. of Toronto conducted Time-Domain Electromagnetic (TDEM) and Magnetometer surveys to cover the east-striking structural trend which hosts the Thierry Mine and the K1-1 deposit (renamed the Ros zone). The initial geophysical survey resulted in the completion of 23.37 line-miles of TDEM and 60.45 line-miles of magnetometer data. A second phase was undertaken to provide more detailed definition of priority anomalies and to extend the coverage to include additional claims staked to the east of the Thierry Mine and Ros zone along the aforementioned, major structural trend.

Diamond drilling contractors began surface drilling on the Thierry project on July 2, 2002, and by November 14, 2002, completed 24 holes for a total of 27 329 feet. This included 11 holes, totalling 14 332 feet, on the Thierry deposit; 7 holes totalling 7627 feet on the Ros zone; 7 holes totalling 3990 feet on an elongated, east-trending geophysical anomaly to the east of the Ros zone; and 2 holes totalling 1380 feet on TDEM and magnetic anomalies between the Thierry Mine and Ros zone (P. Burns, Project Manager, PGM Ventures Inc., personal communication, November 14, 2002).

Diamond drilling identified 2 mineralized zones averaging 4 to 8 m in thickness. Highlights included hole 20, which yielded 4.4 m in the upper zone grading 0.2 g/t platinum, 1.22 g/t palladium and 0.23 g/t gold, plus 2.3% Cu and 0.18% Ni, and a lower zone of 3.1 m grading 0.23 g/t platinum, 0.89 g/t palladium, 0.36 g/t gold, plus 1.5% Cu and 0.14% Ni. Although the results confirm the potential for economic platinum-palladium grades, the surface drilling has proved too expensive, as well as too inaccurate, for ore reserve definition. PGM Ventures now plans to de-water the mine, so that a 15 000 m underground drilling program can begin (*The Northern Miner*, November 14, 2002).

Wolverine Bay Occurrence

The Wolverine Bay occurrence is held by E. Anderson, Kasabonika First Nation and is located 23 km northeast of Kasabonika. Access can be gained in the spring and early summer by boat. With lower water levels, float plane is the suggested mode of transportation to a deep bay located south of the occurrence, at which point a boat is required for a 40-minute trip to the occurrence through 15 to 30 cm deep water. The occurrence is located on the shore of Kasabonika Lake in Wolverine Bay.

The Wolverine Bay occurrence is located in the Kasabonika Lake–Ekwan River greenstone belt, a portion of the Sachigo Subprovince. Previous mapping in the area includes McInnes (1904; 1912); Sanford, Norris and Bostock (1968); Thurston and Carter (1970); and Thurston, Sage and Siragusa (1979). Aeromagnetic data and appropriate ground-truthing significantly helped Thurston et al. (1979) in defining the volcanic belt. No previous exploration work has been performed in this portion of the Kasabonika Lake–Ekwan River greenstone belt.

The Kasabonika Lake–Ekwan River belt is underlain by pillowed basalt, massive basalt, pillow breccia and mafic to intermediate tuffaceous rock. Metasedimentary rocks of arkosic to greywacke composition occur at the west end of the belt, flanking the metavolcanic rocks. Metasedimentary rocks are foliated, grey to buff to slightly green in colour (Thurston et al. 1979).

The Wolverine Bay occurrence consists of mineralization associated with a 10 m wide gabbro unit in contact with mafic metavolcanic rocks, pillowed to massive basalt to the north and mafic tuff to the south. The entire exposure is approximately 40 m across. The gabbro is coarse-grained, consisting of hornblende (after pyroxene), chlorite (after hornblende) and feldspar. The gabbro is dark green to black and is highly deformed for most of the 10 m with rare panels or lozenges of less-deformed gabbro. The shear zone strikes 274° and dips subvertically. Deformation is intense and anastomosing shear zones are visible at several points along the shoreline. Quartz lenses occupy permeable zones created by the dilation. Azurite, malachite, 1 to 3% chalcopyrite and <1% pyrite occur in the quartz vein material. Rare disseminated pyrite occurs in the gabbro. Previous assays by E. Anderson exceeded 2% Cu and 250 ppb Au (E. Anderson, Prospector, Kasabonika First Nation, personal communication, 2002). Two grab samples assayed up to 1.94% Cu.

RECOMMENDATIONS FOR EXPLORATION

Beardmore–Geraldton Area

GOLD DEPOSITS

Gold exploration is recommended on the central and eastern extensions of the Paint Lake–Burrows River fault, a transcurrent fault associated with gold deposits in the western end of the Beardmore–Geraldton belt. Further detailed prospecting for gold is recommended between Geraldton and the Kinghorn Road, on the Paint Lake–Burrows River fault, and along secondary and tertiary faults and/or lineaments.

Feldspar porphyry and porphyritic gabbro intrusions should be prospected along fault zones and/or lineaments. Gold can be associated with pyrite and/or arsenopyrite mineralization. Sulphide minerals are disseminated or may occur in quartz-sericite-carbonate veins and/or stockwork zones within the intrusions or at contacts with metasedimentary and metavolcanic rocks.

Feldspar porphyry sills are commonly late intrusions generated in deformation zones in the vicinity of Geraldton and are associated with pervasive gold mineralization (e.g., Porphyry Hill within the Bankfield–Tombill fault). Examination of all porphyry sills and dikes in Errington and Ashmore townships is recommended. Near-surface, bulk tonnage gold deposits can be associated with the contacts between metasedimentary rocks and porphyries, specifically as quartz-carbonate stockwork vein systems (e.g., F-zone, MacLeod–Cockshutt Mine) (Horwood and Pye 1951; Pye 1951).

Sulphide-replaced, banded oxide-facies iron formation is associated with gold in Geraldton and eastward to under the Paleozoic James Bay Lowlands. The North Zone gold deposit in Geraldton, mined by MacLeod–Cockshutt Gold Mines Ltd. and Hard Rock Gold Mines Ltd., is the only deposit of this type that was mined in the district. Gold mineralization associated with pyrite and arsenopyrite is hosted in a large Z-fold. Production grades exceeded 0.25 ounces of gold per ton (Resident Geologist's Files, Thunder Bay North District, Thunder Bay). The lateral extent of the Southern Metasedimentary sub-belt iron formation provides a high priority, gold exploration target for dilatant zones created by folding or high-angle faults.

Hart et al. (2002) recommended a number of gold targets in the Beardmore area, specific to the Phoenix project:

> Axinite is a borosilicate mineral, that similar to tourmaline, is associated with gold mineralization in a number of areas in the Superior Province (e.g., Chibougamau, Cadillac, Porcupine, Kaministikiquia). However, as with tourmaline, axinite is not exclusive to gold deposits, but rather defines a set of physical conditions that favour the transport and deposition of gold. Nonetheless, the authors suggest that the axinite may be related to the gold mineralization and encourage field and exploration geologists to pay special attention to axinite-rich regions.
>
> There is a potential for gold mineralization in the mafic and intermediate metavolcanic rocks adjacent to the subbelt and assemblage contacts. Past work has concentrated in the metasedimentary rocks in the area around the fold in the contact between the SSB-CVB. The potential for gold mineralization in the adjacent metavolcanic rocks is based on
>
> - auriferous quartz-carbonate veins hosted by andesite flows in the adjacent CVB (*e.g.* Coté-Archie Lake occurrence)
> - association with dilant zone created around a posttectonic diorite
> - gold and molybdenite mineralization is also associated with a posttectonic diorite intrusion along the southern side of the BBA (*e.g.* Tyson occurrences)
>
> There is a potential for gold mineralization, as well as copper and molybdenite mineralization in the metavolcanic rocks and associated post-tectonic intrusions.
>
> There is the potential for additional gold mineralization in quartz veins hosted by structures subparallel to parallel to the Sand River Mine - Leitch Mine No. 2 vein. This vein is hosted by foliation-parallel brittle fractures with steep northwest dips and plunges of about 320°. Auriferous veins that are exposed along the south side of the swamp containing the Leitch Mine tailings are similar in appearance to the descriptions of the veins within the mines. The geometry of these veins is expected to be comparable to the Sand River Mine and Leitch Mine veins, which must be taken into consideration when drilling.
>
> The southwest portion of the SVB in western Kitto Township has not been extensively explored, and not all of the older work in the area was recorded in the assessment files. This area has the potential to host gold mineralization similar to the iron-formation associated brittle-fracture-hosted quartz stringers of the Northern Empire Mine. The best areas for potential mineralization are in the iron formations along the northern boundary of the SSB.

VOLCANOGENIC MASSIVE SULPHIDE (VMS) DEPOSITS

Felsic metavolcanic terrains in the Onaman–Tashota metavolcanic belt should be re-examined for volcanogenic massive sulphides (VMS), especially in the following areas: Marshall–Toronto lakes; Metcalfe–Oboshkegan lakes; Melchett–Colpitts lakes; Elmhirst–Rickaby–Lapierre townships; and O'Sullivan–Muriel lakes. Stratigraphy should be carefully mapped to delineate interflow marker horizons. Rocks should be prospected for sulphides. Units immediately above and below interflow metasedimentary units may host VMS-related alteration and mineralization. Felsic intrusions should be re-examined to determine if they are subvolcanic (i.e., hypabyssal) intrusions.

A re-evaluation of the Tashota–Geraldton–Longlac OGS–Aerodat airborne geophysical survey (OGS 1989) is recommended for generating potential VMS targets. A thorough analysis of the *Operation Treasure Hunt* Fort Hope airborne geophysical survey that was released in February 2003, is recommended for potential VMS targets (Figure 4).

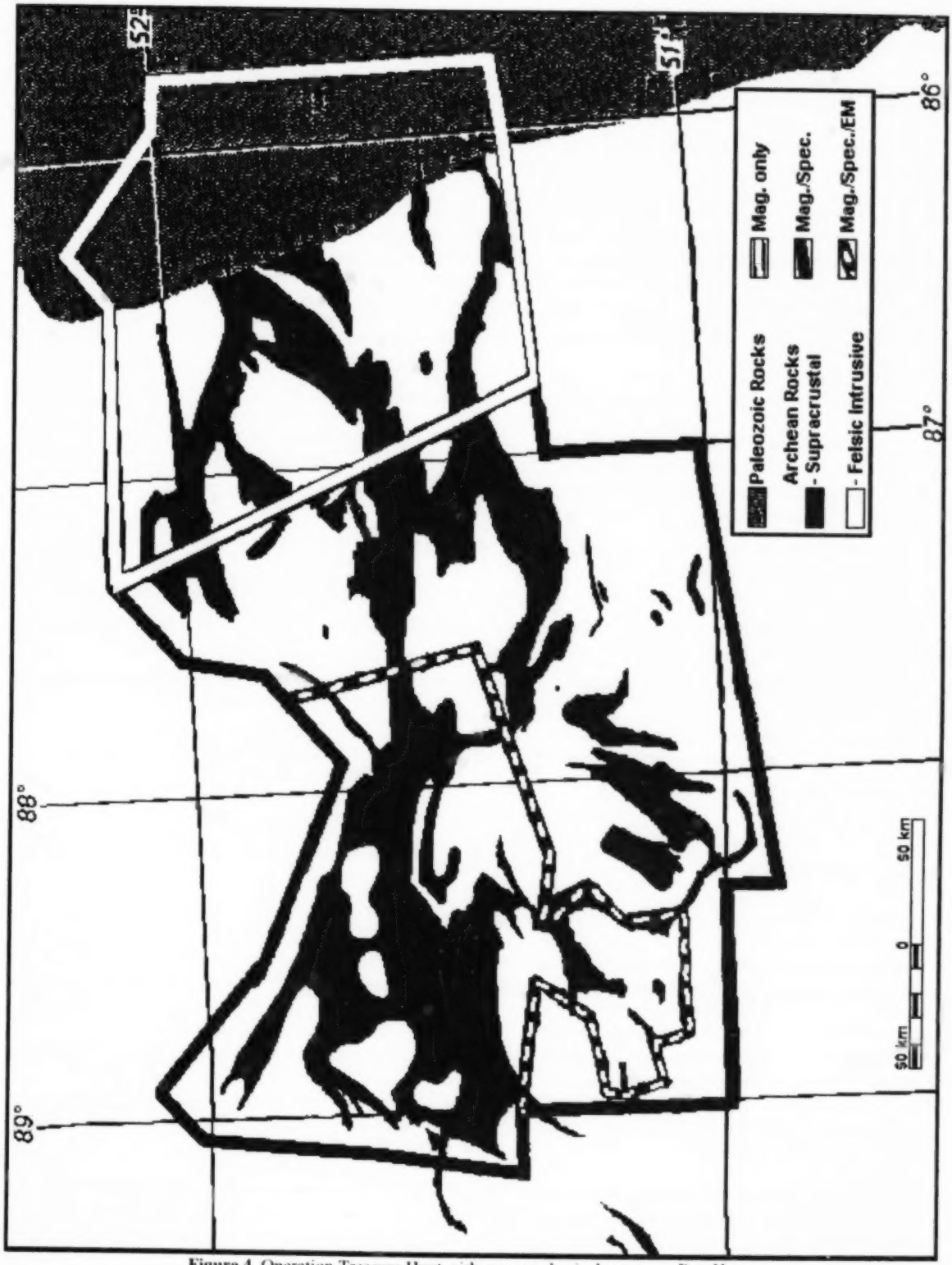


Figure 4. Operation Treasure Hunt, airborne geophysical surveys – Fort Hope.

Fort Hope Area

GOLD DEPOSITS

The Fort Hope area is within the eastern portion of the Uchi Subprovince and is a tabular, east-trending belt (080°) of metavolcanic and metasedimentary rocks forming a semi-continuous supracrustal network. The Uchi Subprovince extends for over 625 km and includes such prolific gold producing camps as Red Lake and Pickle Lake (25 million ounce collective production). The setting for the Fort Hope area gold deposits is structurally and tectonically very similar to the Beardmore–Geraldton belt in the eastern Wabigoon Subprovince. Both zones are marked by major transcurrent faults hosting gold mineralization along or near subprovince boundary contacts that display interleaved "belts" of volcanic rocks and clastic metasedimentary rocks. The widely distributed zone of gold mineralization in the Beardmore–Geraldton belt is expected to similarly occur along the southern boundary of the Uchi Subprovince in the Fort Hope area.

Gold deposit types in the Fort Hope area have been subdivided and documented in OGS Open File Report 5926, *Mineral Occurrences and Prospects in the Fort Hope–Winisk Area* (Mason and White 1995):

- quartz veins in mafic metavolcanic rocks ± porphyry (Currie occurrence, Fort Hope gold mine, Hansen gold occurrence, Pioneer Lake occurrence, Schist Lake occurrence, Zulapa prospect)
- quartz veins, silicification and carbonatization in clastic metasedimentary rocks (Szetu-Bayne occurrence)
- banded iron formation with arsenopyrite or pyrrhotite association (Asarco occurrence, Goss Lake prospect, Wottam Lake occurrence)
- feldspar porphyry + quartz veins and antimony in mafic metavolcanic rocks (Howells Lake prospect)
- feldspar ± quartz porphyry, silicification ± shear zone (KL-12 zone, Talbot Lake gold prospect)
- quartz-tourmaline veins in wacke (North Wottam Lake occurrence)
- strongly foliated to sheared mafic to felsic metavolcanic rocks (OL-12/OL-29 zones, Zulapa prospect)
- quartz-tungsten veins (may be associated with intense foliation to shearing) and mafic metavolcanic rocks hosting pyrite-pyrrhotite-magnetite-biotite (Reserve Creek occurrence, Rich Lake occurrence)

Pickle Lake

GOLD DEPOSITS

In the Pickle Lake belt, gold deposits (Barrett and Johnston 1948; Corking 1948; Cohoon 1986) are located in separate strain domains. The Pickle Crow deposits are products of an early strain event (Domain 1) that preceded the emplacement of the Hooker–Burkoski stock, which is coeval with the 2741 Ma Ochig Lake pluton (Stott and Corfu 1991). Part of the string of Pickle Crow deposits lie within Domain 3, which is interpreted as a late, contact strain aureole imposed by the adjacent 2711 Ma Second Loon pluton and likely represents a structural overprint on the pre-existing gold deposits. In contrast, the Dona Lake Mine is localized in a folded, sheared and sulphidized banded magnetite iron formation within the strain aureole of the 2741 Ma Ochig Lake pluton. One could interpret the shear zone as a product of contact strain, which would imply that each of the 2 principal episodes of gold mineralization in the Pickle Lake belt preceded the main period of Kenoran orogenesis and thus predated the mineralization at Red Lake (Stott and Corfu 1991). The relation of such pre-Kenoran gold mineralization to earlier orogenic remains to be studied.

Past gold production and current gold resources suggest that the Meen–Dempster greenstone belt of the Uchi Subprovince warrants re-examination for gold mineralization targets. Seim (1993) described 5 principal types of gold deposits within the confines of the Meen–Dempster greenstone belt:

1) Gold-bearing quartz veins occurring in discrete shear zones (e.g., Golden Patricia Vein, Tonsil zone, Koromond occurrence, Flicka occurrence).

2) Gold-bearing quartz veins filling tension-induced fractures (e.g., Sudbury Point occurrence, South Dunlop Lake occurrence).

3) Shear zone-hosted areas of silicification and/or sericitization and/or carbonatization and/or sulphidization (e.g., Dobie River zone, Umex–Dorothy Lake, Koval–Ohman).

4) Gold-bearing sulphide replacement zones within iron formation and ferruginous metasediments [*sic*] (e.g., Kasagiminnis Lake deposit, McVean Lake occurrence, Esker zone, Powerline zone, B-zone).

5) Gold-uranium mineralization in the sheared contact between the metavolcanics [*sic*] and the North Bamaji pluton (e.g., Kirkland Townsite Showing #1).

Many of the gold occurrences described in this report include mineralization that can be placed into one or more of the above deposit sites. For many others, the geological information available is not sufficient to classify the deposit type.

A common feature of the majority of the gold occurrences in the Meen–Dempster greenstone belt is their association with highly sheared and deformed rocks. These highly deformed rocks may be parts of a belt-wide set of deformation zones as suggested above. Andrews et al. (1986) suggested that, in the Red Lake greenstone belt, the gold deposits are essentially products of hydrothermal fluids introduced into ductile deformation zones at a late stage in the tectonic history of the belt and at about the time of plutonic emplacements. This may also be the case on the Meen–Dempster greenstone belt. Stott and Wallace (1984) and Stott and Corfu (1991) suggest that the deformation zones in the Meen–Dempster greenstone belt were active at different points late in the tectonic history of the belt and at about the time of the emplacement of some of the internal plutons. Thus, it is suggested that the role of the deformation zones in the Meen–Dempster greenstone belt, with respect to gold mineralization, may have been similar to that of the deformation zones in the Red Lake greenstone belt.

North Caribou Belt

GOLD DEPOSITS

Gold mineralization is now known to occur in seven supracrustal assemblages of the North Caribou belt and involves the following 3, generalized environments (Breaks et al. 2001):

1. Banded Iron Formation (BIF): grunerite-magnetite-chert
2. tourmaline-carbonate quartz veins (pre-D_2)
3. syn-D_2 shear zones

OGS ACTIVITES AND RESEARCH BY OTHERS

G.M. Stott and H.C. Halls (Precambrian Geoscience Section, OGS) undertook a paleomagnetic, geochemical and U/Pb geochronologic study of mafic dikes in Northern Ontario and their relevance to kimberlites and mineralization in the Nipigon Basin.

G.M. Stott and G. Johns (Precambrian Geoscience Section, OGS) continued with the bedrock map compilation project, northwestern Ontario.

The Fort Hope airborne geophysical survey was released in February 2003.

The *Precambrian Geology of Kitto, Eva, Summers, Dorothea and Sandra Townships, Northwestern Ontario: Phoenix Bedrock Mapping Project* (OFR 6095), authored by T.R. Hart, M. terMeer and C. Jolette, was released in 2002.

J.A. Percival (Geological Survey of Canada) and M.D. Young (MSc candidate, Queen's University, Kingston, Ontario) continued with a lithotectonic study in the Pickle Lake greenstone belt. The study is a portion of the NATMAP Western Superior Crustal Evolution study.

The Lake Nipigon Geoscience Initiative (LNGI) was created in 2002 (Ontario Ministry of Northern Development and Mines, News Release, March 12, 2002). The LNGI is a $7.0 million project aimed at attracting mineral investment to the area of Lake Nipigon. The Ontario Prospectors Association's portion of the project is funded through an agreement with the Northern Ontario Heritage Fund. The Ontario Prospectors Association is partnering with the Ontario Geological Survey, private sector partners, Lakehead University and communities in the Lake Nipigon area. The project will develop a comprehensive geoscience database that will assist mineral explorers in their search for copper, nickel, platinum group metals and copper–gold-rich mineral deposits (Ontario Prospectors Association, News Release, August 22, 2002). The Initiative will involve community and industry consultations to help define the parameters of the project. A thorough compilation of previous exploration and geoscience data will provide a baseline for the project and identify potential gaps in the geoscience database. The Ontario Geological Survey will help acquire and will publish the results of the geoscience studies as maps, reports, and digital data sets. The information will then be available over the Internet through the Ministry of Northern Development and Mines' ERMES and CLAIMap systems. This valuable information will be used to globally market the resource potential and investment appeal of the Lake Nipigon region (Ontario Prospectors Association, News Release, August 22, 2002). John Mason is a member of the implementation committee.

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Table 4. Mineral deposits not being mined in the Thunder Bay North District in 2002.

Abbreviations

AF ..... Assessment Files
CMH ..... Canadian Mines Handbook
GR ..... Geological Report
MDC ..... Mineral Deposit Circular
MDIR ..... Mineral Deposit Inventory record
MLS ..... Mining Lands, Sudbury
MR ..... Mining Recorder
NM ..... The Northern Miner
OFR ..... Open File Report
PC ..... Personal Communication

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Arseno Lake (53B14/NE)	Zn, Pb, Cu, Ag	1 million t @ 8.7% comb. Zn-Pb, 1.5 opt Ag	Northern Dynasty Minerals Ltd.	1988 Annual Report Northern Dynasty Explorations Ltd.	Inactive
Big Trout Lake (53H12/SW)	Pt, Pd, Cr	Not available	Platinex Inc.		
Brookbank (42E12/NW)	Au	1.463 million t @ 6.4 g/t Au inferred (2.0 g/t Au cutoff)	Ontex Resources Ltd.	BCE Emergis E-News Services 2001-03-08	New Reserves 2001
Dobie Zone (52O06/NE)	Au	301 000 t @ 5.5 g/t Au		MDIR KP1082	Inactive
Goss Lake (52P09/SW)	Au	300 000 t @ 0.23 opt Au to 60 m depth	Landore Resources Inc.	CMH 1995-96, p.50	2002-03 exploration program
Headway Coulee (42L04/SE)	Zn, Ag	250 000 t @ 4.44% Zn, 1.32 opt Ag	N. Cox, M. Holt	OFR 5630, p.41	Diamond drilling and stripping – Big Mac zone 1995. Geophysics 1997.

Deposit Name/ NTS	Commodity	Tonnage-Grade Estimates and/or Dimensions	Ownership References	Reserve References	Status
Howells Lake (52P10/SW)	Au	83 000 t @ 0.07 opt Au (+1.37% antimony) and 660 000 t (+3.1% antimony) with erratic Au values	Homestake Canada Inc.	OFR 5926, p.68	Last active in 1988.
Jacobus (42E13/SE)	Cu, Ni	1 million t @ 0.94% Cu-Ni	NWT Copper Mines Limited	CMH 1995-96, p.275	Most recent work diamond drilling by SEG in 1993. Deposit open down plunge.
Juneau Lake (42L05/SW)	Ni, Cu, PGE	2.2 million t @ 0.87% Ni, 0.59% Cu	Landore Resources Inc.–Brancote	OFR 5630, p.41	Diamond drilling 2001.
Karl–Zeemel (53B09/SW)	Au	327 000 t @ 4.6 g/t Au	Barrick Gold Corp./Placer Dome North American Ltd.	NM Jan. 8, 1996, p.15	
Kasagiminnis Lake (52O08/SW)	Au	2.9 million t @ 0.14 opt Au	McVicar Minerals Ltd./Asia Now Resources Ltd.	NM Apr. 18, 1988	Acquired 2002
Koval–Ohman (52O07/SE)	Au	471 589 t @ 5.81 g/t Au	Barrick Gold Corp.	MDIR KP0243	Inactive
Lavoie Lake (43D05/NE)	Cu, Ni	14.6 million t @ 0.58% Cu, 0.37% Ni	Aurora Platinum Corporation	OFR 5926, p.101	Acquired 2002
Lynx Canada (42L04/SE)	Cu, Ag	25 000 t @ 4.0% Cu, 300 000 t @ 2.0% Cu, 1.0 opt Ag	N. Cox, M. Holt	OFR 5630, p.41	Diamond drilling and stripping – Big Mac zone 1995.
Magnet Consolidated Mine (42E11/NE)	Au	150 700 t @ 0.38 opt Au, 1 082 340 t @ 0.34 opt Au	Roxmark Mines Limited/Beaurox Mines	CMH 1995–96, p.330	U/G development in 1982–87.
Marshall Lake (42L05/NE)	Cu, Zn, Ag, Au	1.22 million t @ 3.2% Zn, 0.94% Cu, 2.2 opt Ag	Giant Gripp Mines	CMH 1995–96, p.275	Diamond drilling 1996–97. Reinterpretation 1997, 2000.
Norton Lake (42M14/NW)	Ni, Cu	1.0 million t @ 0.72% Ni, 0.56% Cu	East West Resources Ltd.	OFR 5926, p.136	Geophysics, geochemistry, diamond drilling 2002.
Paulpic (42L04/NE)	Au	200 000 t @ 0.231 opt Au	Canada Tungsten Inc.	OFR 5630, p.465	Last active 1987.
Pickle Crow gold mine (52O09/SE)	Au	497 077 t @ 0.35 opt Au	Cantera Mining Ltd.	Cantera Website Aug. 13, 2002	Mill construction, ore stockpiling - No 1 & No. 5 veins.
Thierry Mine (52O08/NW)	Cu, Ni	7 million t @ 1.88% Cu, 0.23% Ni, 15.5 million t @ 1.92% Cu	PGM Ventures Inc.	UMEX 1982	Geophysics, diamond drilling 2002.
Umex–Dorothy Lake (52O06/NW)	Au	236 220 t @ 6.17 g/t Au	Major General Resources Ltd.	MDIR KP1072	Inactive
Zulapa (42M12/SW)	Au	700 000 t @ 0.28 opt Au to 200 m deep	Eabametoong First Nation	OFR 5926, p.208	

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Metric Conversion Table

Conversion from SI to Imperial			Conversion from Imperial to SI		
SI Unit	*Multiplied by*	*Gives*	*Imperial Unit*	*Multiplied by*	*Gives*
		LENGTH			
1 mm	0.039 37	inches	1 inch	**25.4**	mm
1 cm	0.393 70	inches	1 inch	**2.54**	cm
1 m	3.280 84	feet	1 foot	**0.304 8**	m
1 m	0.049 709	chains	1 chain	20.116 8	m
1 km	0.621 371	miles (statute)	1 mile (statute)	**1.609 344**	km
		AREA			
1 cm^2	0.155 0	square inches	1 square inch	**6.451 6**	cm^2
1 m^2	10.763 9	square feet	1 square foot	**0.092 903 04**	m^2
1 km^2	0.386 10	square miles	1 square mile	2.589 988	km^2
1 ha	2.471 054	acres	1 acre	0.404 685 6	ha
		VOLUME			
1 cm^3	0.061 023	cubic inches	1 cubic inch	**16.387 064**	cm^3
1 m^3	35.314 7	cubic feet	1 cubic foot	0.028 316 85	m^3
1 m^3	1.307 951	cubic yards	1 cubic yard	0.764 554 86	m^3
		CAPACITY			
1 L	1.759 755	pints	1 pint	0.568 261	L
1 L	0.879 877	quarts	1 quart	1.136 522	L
1 L	0.219 969	gallons	1 gallon	**4.546 090**	L
		MASS			
1 g	0.035 273 962	ounces (avdp)	1 ounce (avdp)	28.349 523	g
1 g	0.032 150 747	ounces (troy)	1 ounce (troy)	**31.103 476 8**	g
1 kg	2.204 622 6	pounds (avdp)	1 pound (avdp)	**0.453 592 37**	kg
1 kg	0.001 102 3	tons (short)	1 ton (short)	**907.184 74**	kg
1 t	1.102 311 3	tons (short)	1 ton (short)	**0.907 184 74**	t
1 kg	0.000 984 21	tons (long)	1 ton (long)	**1016.046 908 8**	kg
1 t	0.984 206 5	tons (long)	1 ton (long)	**1.016 046 90**	t
		CONCENTRATION			
1 g/t	0.029 166 6	ounce (troy)/ ton (short)	1 ounce (troy)/ ton (short)	34.285 714 2	g/t
1 g/t	0.583 333 33	pennyweights/ ton (short)	1 pennyweight/ ton (short)	1.714 285 7	g/t

OTHER USEFUL CONVERSION FACTORS

	Multiplied by	
1 ounce (troy) per ton (short)	31.103 477	grams per ton (short)
1 gram per ton (short)	0.032 151	ounces (troy) per ton (short)
1 ounce (troy) per ton (short)	20.0	pennyweights per ton (short)
1 pennyweight per ton (short)	0.05	ounces (troy) per ton (short)

Note: Conversion factors which are in bold type are exact. The conversion factors have been taken from or have been derived from factors given in the Metric Practice Guide for the Canadian Mining and Metallurgical Industries, published by the Mining Association of Canada in co-operation with the Coal Association of Canada.

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